ROD & Custom

MARCH, 1954 25 CENTS

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Custom Ford with South Pacific look.
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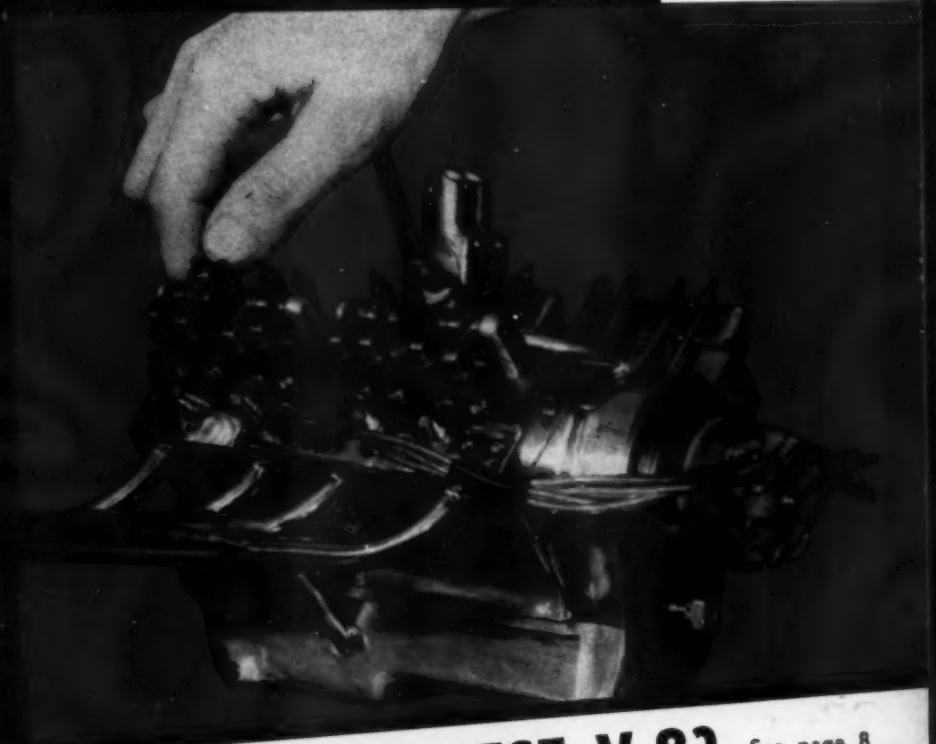

WORLDS SMALLEST V-8?

See page 8

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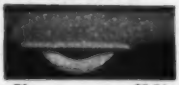

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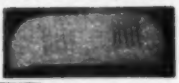

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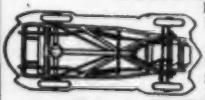

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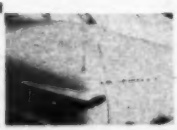

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editorial . . .

Are you tired of reading how who did what to his engine? Are you so weary of hearing about Detroit's horsepower race that you feel like screaming every time someone mentions it? Or is an engine just an engine to you and you're content to leave it alone and let it do its job as best it can? How ever you may feel, this issue of R & C may stimulate your imagination and send you off into deep thought. Take, for instance, the engine article beginning on page 8. This little item created so much interest around here that all work came to an abrupt halt when Norman Seymour walked into our offices. Norman is responsible for that fabulous 7½" engine on our cover. If you don't believe that it actually runs, drop around and I'll show the oil spots on my desk and the burn on my hand. *Little* headers get hot, too!

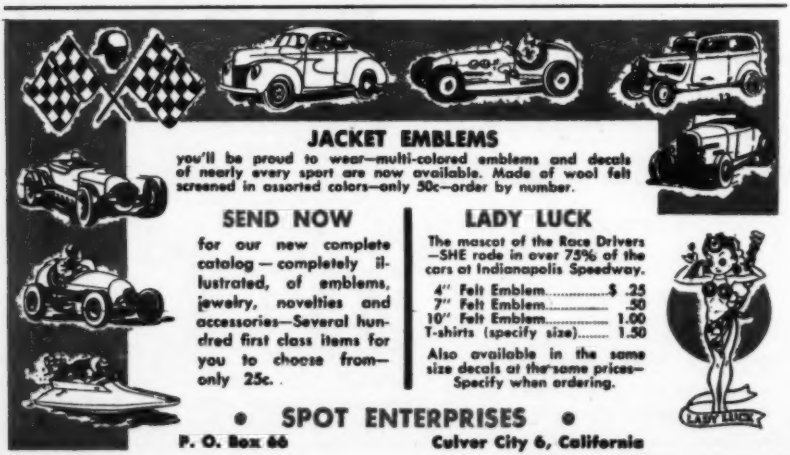
If the world's smallest operating ohv V8 doesn't move you, then cast your peepers on page 16. The engine in your car doesn't look the way it does just because someone wanted it to. Engines, like everything else, have passed through periods of change and development and have reached their present state only after many years of research. How can an engine be *researched*, you ask? Research, in this case, means the development, and disproving, of engines entirely different in operation and design than those which power our cars. Here are four pages of engines that are so strange in appearance that many will doubt that they were actually built. But they were!

If you feel that gasoline powered engines, regardless of size or shape, are not the answers, then how about steam engines? Don't say that steamers went out with high button shoes and "23 skiddoo". They're still with us whether you know it or not. Right here in this country there are steam powered vehicles that are not holdovers from the twenties or any other era. One that we know of is a purely conventional, 1953 automobile that was taken right from the show room and converted to steam operation. Outwardly it resembles any other car of similar make and model but the resemblance ceases when the hood is lifted. There, big as life, is a steam boiler that produces more power for the small, four cylinder engine than you can imagine. It is not an experimental car, either. The engine has been proven and the difficulties of the old steamers were overcome.

Some day you may have your choice of gasoline or steam power, whichever you desire. One major manufacturing concern is testing a radically new steam engine design which you may see advertised within a year.

The only major difficulty right now is the cost of the steam units and the price of installation. With increased production, though, the cost will become lower. However, those fortunate enough to be blessed with a fat bank roll can have anything from a Cadillac to a Crosley converted to steam operation right now — if they so desire.

If you *still* don't think the solution to the ultimate in automotive power has been developed, remember that this is the age of the atom and anything can happen. How soon will we have atom powered cars? Sooner than you think, probably. A chunk of something or other the size of an ice cube may provide fuel enough for a trip from Maine to California. And back again, too, if you don't care for our climate!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ROD & Custom

Vol. 1, No. 11 — March, 1954

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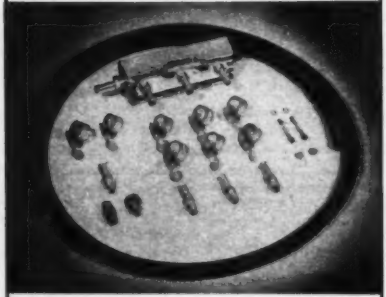

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Correspo

WHERE TO GET PLEX-I-GLASS

ROD & CUSTOM for November, 1953, carried a How-to-do-it article on the building of dash knobs and accessories from bright colored Plex-i-glass. A great quantity of mail has crossed our desks asking where this material may be obtained. The small sheets of plastic used in the article were obtained from Plastic Center, 1542 W. Olympic Blvd., Los Angeles, Cal. Various colors are available including green, white, blue, red and yellow. Special dyes are also available which, when mixed, can be used on transparent Plex-i-glass to produce practically any shade desired.

MORE ABOUT THE T'S

Last January in "What's Become of the Model T?", we stated that there were, as nearly as we could determine, 5,000 Model T's currently registered in the United States. However, the Marketing Research Department of the Ford Motor Company tells us that five years ago, on July 1, 1948, a registration count of Ford passenger cars was made. At that time 49,869 cars built during 1927 or earlier were registered annually in this country. The count would not be considered accurate now but it would not be unreasonable to estimate that this number has since dwindled by only a very few thousand—a conservative guess would put the figure at 40,000. With only one running T out of every four being registered, it takes little calculating to arrive at a figure of 160,000 Model T's still in everyday use in this country alone!

POLICEMEN PRO . . .

I'm not sure what prompted me to write except I would like to show my appreciation for a very worth while little magazine. From cover to cover your magazine is very informative and very enjoyable to read. I especially liked your speed formula for the quarter mile. That's something college physics never taught me.

Not long ago, as I was driving through Texas, I was pulled over by a policeman. Since my Olds 88 had been recently equipped with dual pipes I naturally expected a fine. Imagine my surprise when the officer said, "Where did you get those pipes?—I would

pondence

certainly like a set like that on my Olds." He also asked the price and if they were difficult to install. Naturally I eagerly gave him the answers. He thanked me and took off. Surprised? I was really puzzled! Needless to say I was thankful and glad to know of at least one officer who appreciated pipes.

Larry deZavala — Lake Charles, La.

. . . AND CON

Would like to begin by congratulating you on your fine magazine. I have a '46 Ford with a ⅜ by ¼ Merc engine equipped with Edelbrock heads and Evans 3 jug manifold. The exhaust is routed through Belond headers and Douglass mufflers. I also have an experimental cam ground especially by Bill Collins. I drove my car from San Francisco to New York and experienced no difficulty with the "big" engine.

The police back here see a car with Calif. license plates and immediately consider this excuse enough to stop the car and try to find something to write up. A characteristic of a radical cam is a sharp exhaust rap as you probably know. Therefore, I seldom drive my car any more when on liberty.

Also, the so-called "hot-rodders" back here get mad when I refuse to tell them what is in my engine. The reason I won't tell them is because I have spent over $1,000 experimenting with engines to get one to really "go" and yet not cause any trouble whatsoever when used on city streets. As for those readers who may think that this engine idles roughly, I can safely say that it does — particularly with the 18-lb. flywheel.

I'll sign off with a thanks for your magazine which is a real boon to a Californian in the East.

Bob Arnold — U.S.C.G. New York

• *If you really want to drive your car while on liberty, Bob, why not replace your mufflers with a pair of mufflers that are stock. This will quiet your exhaust but not decrease your engine's efficiency at all.*

We can well appreciate the time, trouble and money that you have in your engine but why not give the Eastern enthusiasts helpful hints? If they are led in the proper direction, by one like yourself, maybe some of the "squirreling" would be eliminated.

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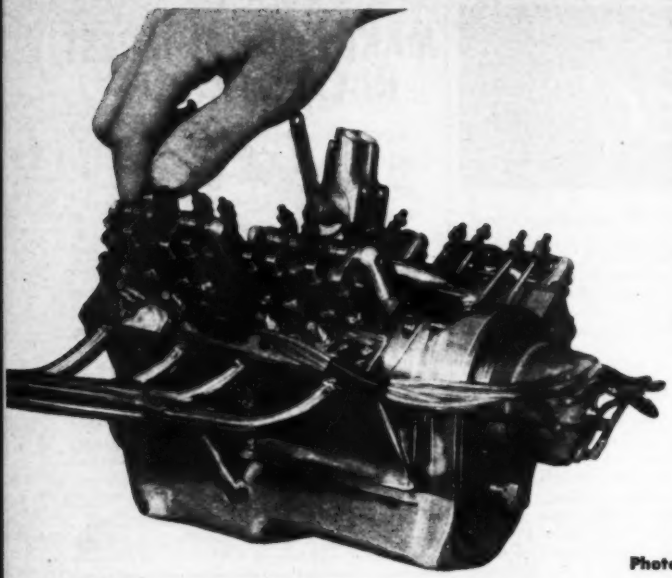


Photography by Poole

This might be...

The World's *SMALLEST* OHV V8 Engine

Does it run? It does, to the tune of 7000 rpm.

by the Editor

WITH A screaming roar that scared the wits out of the neighbors and sent his wife scurrying for shelter, Norman Seymour of Whittier, Calif., fired up his ohv V8 engine early one morning last summer. The starting of the engine marked the climax of a story. A story that had its beginning nearly six years before.

Back in 1947 Seymour decided that he was tired of the common automobile engine. He was tired of tinkering with them and tired of paying exhorbitant prices to high priced mechanics for work of which he was incapable. He is the first to admit that he doesn't know too much about engines so he made up his mind that the only way to obtain first hand knowledge of such an intricate piece of machinery was to build one. Not to merely modify a present day engine which is what we sometimes call "building", but to actually sit down and *build* one — from scratch!

Seymour toyed with this idea for several years until one day late in 1951 he began making plans in dead seriousness. He toiled over his drawing board for nearly a year — planning, sketching, figuring and altering — before he decided upon a design that exactly suited him. He didn't copy existing valve designs, combustion chamber shapes or carburetion from a production engine. Why? Because he didn't know enough about them. Instead he planned his engine the way he, and he alone, wanted it and he let no experienced mechanics give him any advice. Come to think of it, an ordinary automobile mechanic prob-

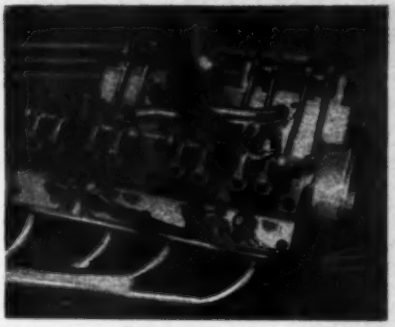
ably wouldn't have been able to help him very much for his engine differs from the average engine in that *it is only 7½" long and weighs but ten pounds!* (less flywheel.)

Seymour works for a Whittier firm as an experimental machinist and has had several years experience in operating lathes, mills and planers. Therefore, he was well qualified, from a background point of view, to begin his project. Starting with a block of 24ST aluminum that measured 4" x 4" x 8" and weighed fifteen pounds he began grinding, milling and drilling until the block was reduced to a little over four pounds in weight and at the same time somewhat resembled a piece of Swiss cheese what with all of its holes.

He worked slowly but constantly, choosing his operations in their proper chronological order and seeing them through to completion before starting on the next step. The longer he worked, the more carefully he proceeded because a slip would have meant countless hours of extremely tedious labor wasted.

As a hobby, some years ago, Seymour made jewelry for his wife and became so adept at it that his friends and *their* friends began presenting him with requests. The demand for his work eventually exceeded its status as a hobby so he changed to something a little different. This background of close, careful work gave him a foundation for something in the miniature field. He chose model airplane engines as an outlet for his inhibitions. He mounted them on stands and ran them until they literally wore out from pure use. Then he would tear them down and rebuild them. Sometimes he would bore the cylinder on a particular engine a little larger than its stock size and fit it with an oversize piston. On others he would mill the head slightly to gain additional compression. This hobby culminated in an engine that would be the forerunner of the two year project to follow. He took four model engines – 2 cycles at that – and mounted them on a crankcase of his own design. He machined a crankshaft, bought four little glow plugs and started the little opposed-four up. It ran fine, too. Fine, that is, until a rod let go during extreme rpm's. Then and there he decided to build an engine that could "take it" and thus was started the engine to end all engines.

With all of his experience with model airplane engines, he naturally turned to this field to procure some of the parts for the four cycle V8 that he had in mind. He rounded up eight, two-ring pistons and eight steel sleeves. The sleeves he selected happened to have an inside diameter of 15/16" so this predetermined the size of the bore. Using this as a starting point, he settled for a ⅞" stroke which gave him an engine of over square design. The size of the bore and stroke determined the size of the finished engine to a certain extent. The other size-limiting factor

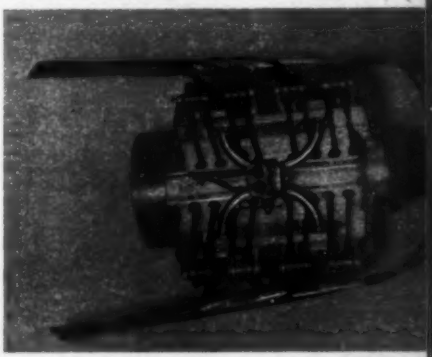


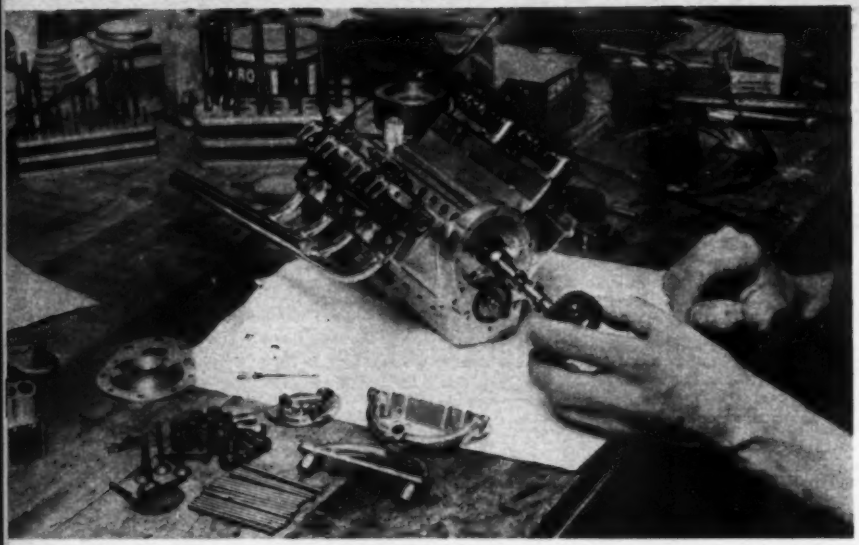
Engine appears as a normal size unit in detail photo. Valve springs and spark plugs are only visible parts not built by owner. The tiny V8 runs equally well at 900 rpm or at 7000 rpm. Rocker arms represent months of tedious work and took longer to make than the block itself. 15/16" bore and ⅞" stroke provides little less than five cubic inches. Compression is 7 to 1.

was the 4" square block of aluminum that he had purchased. He decided to build the engine *inside* this piece of metal.

He designed the rods, the crankshaft, the cam, and so forth. In fact, it would be easier to say that the parts he *didn't* make were the 4 ball bearings, the 2 timing gears, the 8 pistons, the 8 spark plugs and the 16 valve springs. He made every other piece in the V8 – over three hundred parts not counting the Allen head screws that hold the little but complex piece of machinery together.

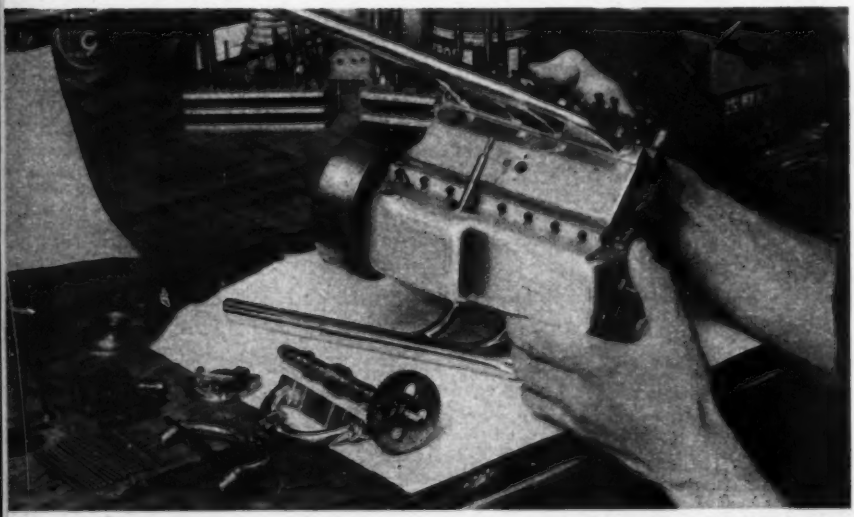
A birds eye view of the complete engine shows arrangement of parts. Notice the single, dual throat carburetor and twin intake manifolds. The heavy, four pound flywheel will be cut down and fitted with a clutch and transmission in the near future. Pushrods are inclined toward each other due to difficulty in locating cam followers directly under the valve rocker arms.

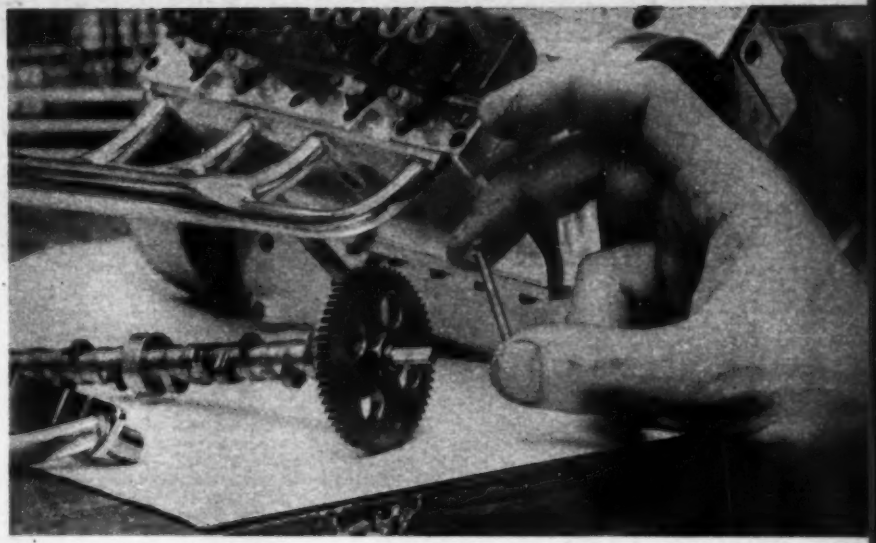




"Full race" cam is carefully inserted by owner. Cam is supported by two bearings and a bushing. Four lobe breaker point cam is at end of crank. Upright tube at top of block at rear is the oil breather stack also used for adding 10 wt. oil. All external aluminum parts are highly polished and other metals are chromed giving the engine a very professional and "show case" appearance.

The pan, like most of the engine's parts, was machined from a solid billet. Notice the drain plug at the end of pan and the oil dip stick. Oil measure is true due to "full" and "add" marks. Hole in side of block is water outlet. The flywheel presently weighs ⅓ as much as the engine.





Hand of the builder gives indication of small size of exhaust valve. The cam, most difficult part of the entire project, was designed by Kenny Harman, formerly of Harman & Collins. Location is workshop where pint-sized engine was built. The most aggravating part of the whole job was the doubt whether the engine would run — it did! Two weeks were needed to fire it up first time.

Initial attempts at the drawing board showed him that an L head engine was out of the question so he settled for one of overhead valve design. He designed, and made, the 16 rocker arms, the 16 pushrods, the 16 valves, the 16 valve guides, the 4 rocker shafts and stands, and so on *ad infinitum*.

It may be interesting to note here that he encountered no little difficulty in positioning the valves directly in line with the cam lobes and the cam followers. Rather than offset the rocker arms he inclined each pair of push rods toward each other. A logical solution.

The rocker arms are adjustable, naturally, in a simple but effective manner for an engine so small. The outer tip of each arm was drilled and tapped. An Allen head screw was inserted into each arm after the screw's head had been bored to a perfect 1/16" radius — the same as the tips of the push rods. A lock nut securely holds each adjusting screw in proper position. The tips of the push rods and rocker arms, as well as a good many other parts of the engine, were hardened for long-wearing qualities.

The crankshaft was machined from a solid block of 4130 chrome moly steel — complete with counterweights and with the whole unit highly polished in the best of hop up traditions! It is supported at either end by ball bearings and in the center by a two-piece bushing—a three main bearing crank, no less!

The camshaft presented a different problem. As you may well know, the cam timing of an engine is perhaps its most important feature. The valve overlap, as well as other peculiarities, is only right in one position and one position only. Seymour thought this over for a long time and eventually had a tentative plan outlined. Then, he called on his friend Kenny Harman. (Formerly of Harman and Collins.) Kenny showed him several errors in his thinking and went on to design the proper cam — a radical one at that. Moreover, he spent many long hours setting up a special cam grinding machine to do the job. Seymour and Harman worked together for a long time before the resulting camshaft was completed to their satisfaction, all 6½" of it. Being a cam of truly experimental design, it is not quite up to Seymour's expectations so he has not gone to the expense of having it hardened. Although it is made of hard drill rod, it is beginning to show signs of wear at the tips of the lobes.

The cam is a veritable masterpiece of work. Like the crank, it is supported at either end by ball bearings and in the center by a bushing. The cam chamber in the block opens to the crank cavity for oiling purposes — the present oiling system being of the splash type. Plans are now on the drawing board for an

(Continued on page 64)

The experts screamed...

IT CAN'T BE DONE

...so *Max went ahead and did it*

SOMEBODY ONCE said you couldn't stroke a Buick V8. Luckily it wasn't us, for here is an "unstrokable" General Motors engine which (how'd you guess it?) has been stroked.

Glancing over the specifications of this latest of G M's engines we find that the pistons are not of the slipper-type like the Cadillac and Oldsmobile wherein the piston's skirts are relieved to clear the counterweights. In this model the counterweights are cam ground and the pistons are fully skirted leaving but a minimum of clearance between the two. Any increase of stroke would naturally result in the skirts knocking against the revolving weights with disastrous results — unless some altering was done.

At any rate that is what Max Balchowsky had heard before he tore into his first Buick engine. "Nothing is impossible!" we heard him say as he reached the innermost depths of a vertical-valve wonder, and just to prove a point he went ahead and stroked the bear 3/16" so the world would know that he knew what he was talking about.

The whole thing came about when Max decided that the roadster left in his care needed a little more punch. It seems that Max had taken a great interest in road racing and wanted to pit the channeled '32 street roadster against some of that stuff from across the seas.

Going back a year or two we find that the car isn't actually Max's, it belongs to one Fred Vogel who, when he was called elsewhere, left the bomb in Max's capable hands. At that time the machine was motivated through the use of a full-house '38 LaSalle V8 which provided a lot of *go* but which caused the car to handle none too well what with that great mass of iron over the front wheels. With the approach of the now past March Air Force Base (Calif.) road races, Max pulled the LaSalle mill from its resting place and talked his friend Leonard Teitzell into loaning him his recently acquired Buick V8. He pulled *that* engine from its home in — now get this — *a 1950 Mercury!* The engine had previously succeeded in pushing the heavy Merc sedan through the standing quarter mile in the high nineties with the only alteration being the use of dual four-throat carburetors mounted via a Golden intake manifold.

To continue with Max's modifications, the

"impossible" was accomplished by the simple method of cutting away part of the piston's skirts so they, in reality, became of the slipper-type like brothers Cad and Olds. Max reports to us, though, that a lot of work was necessary to the crank and the block before they could be reunited but just what that work entailed Max classifies as confidential.

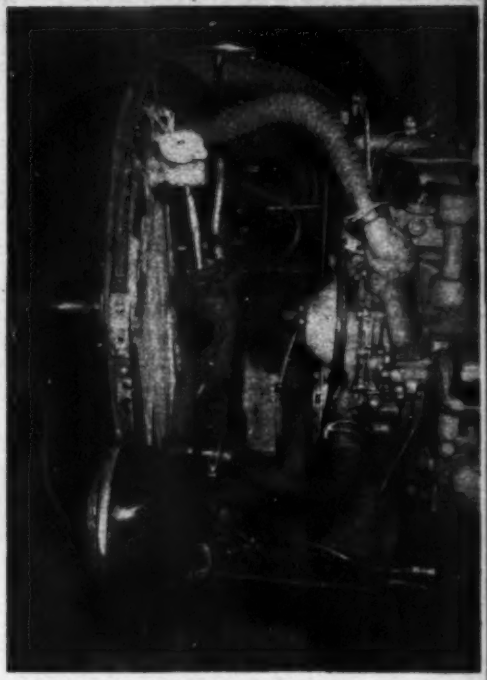
The engine was bored .004" oversize to give racing clearance to the stock pistons. A cam was ground to Max's orders and inserted in the block and the usual procedures of porting and relieving raised the efficiency of the engine's breathing characteristics.

A little head milling was in order so the planer was put to work and soon the compression had been raised a considerable amount. The problems of mounting the engine in the roadster were simplified since the car carried a Ford transmission as did the Merc from whence it came and the modifications had been carried out before. Space did not create any questions since more than enough room was left when the LaSalle had been removed. The only modifying necessary was the fabrication of the front engine mounts and this was taken care of after the engine had been swung into place. Heavy steel plating was welded to the frame rails and the engine bolted down.

Since the LaSalle engine had required two water inlets and outlets in the radiator one of each was plugged off as they were no longer needed.

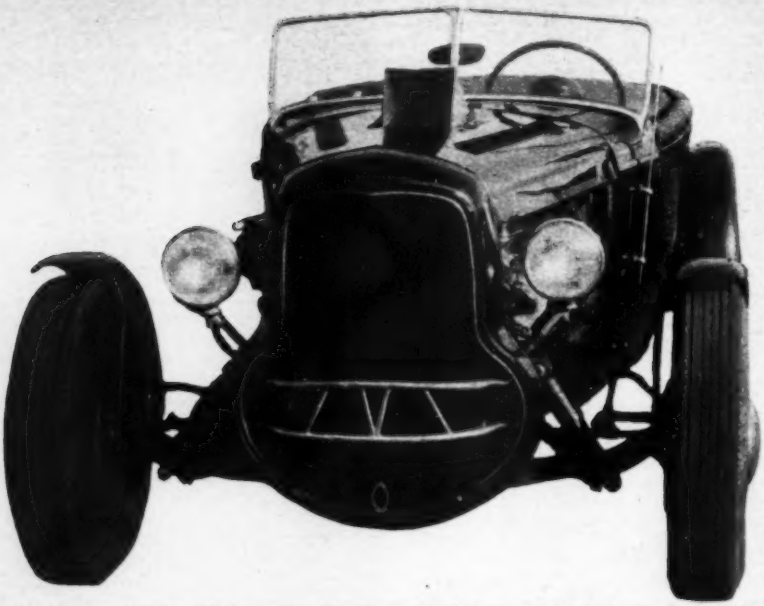
In the last minute rush before the race a lot of frantic work was accomplished with the result that the car barely appeared on schedule at the road race.

The Ferrari, Allard and Cunningham owners laughed outwardly at the sight of the home-brewed street roadster fresh from the highways but by the time the main event had been going for a few laps many of them had



Buick V8 engine is located well back in the frame giving satisfactory handling qualities. Horsepower is 270 and torque rated at 400 lbs. Roadster turned 110 in standing quarter mile.

Heeling only slightly, Max Batchowsky brings the street roadster out of a sharp curve at road race. Car is powered by a 270 hp Buick V8 stroker. The rod was clocked at 136 mph, during the race, before it quit at 107 miles. Despite not finishing, car won class A mod.

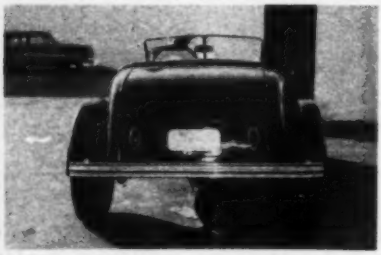


Grille shell was formed of '32 section bulged out at the bottom to hide the frame. The front suspension is from a 1940 Ford. Scoop on hood is to admit fresh air to the dual carburetors.

changed their tune. The car behaved like a perfect gentleman on the twisting, turning course and showed its heels to a lot of expensive imports. Included in the 5600 foot back stretch was an electric eye system to catch the speeds of the cars. The leading Cunningham blasted through the measured mark upwards of 147 mph but when the timer clocked the rod through at 136 mph he thought he was seeing things. Time and again the roadster's time was taken and time and again it proved to be in the high 130's. Surprise, surprise, it was trailing an all-out Cunningham with John Fitch at the helm by a mere ten miles an hour!

The pace set by the leading Cunninghams and the close following Ferraris was just a bit too much for the roadster, though, and as Max wheeled out of a sharp turn and stormed into the long main straight away, the transmission let go with a crunch that could be heard above the roar of a good many un-

A lot of unhappy foreign car drivers saw this view of the '32 during road race. Taillights are from a '39 Ford. Set-in license plate is a holdover from the days prior to World War II.



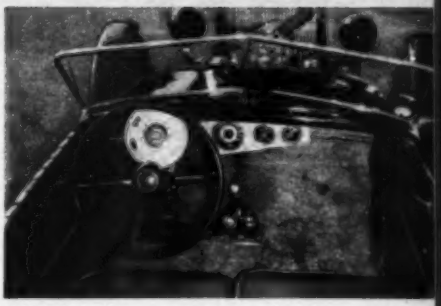
Modifications to the Buick V8 include stroking, porting and relieving, boring, solid lifters, dual carburetors and milled heads. Engine is set well back in compartment for good balance.

corked engines. Car won its class, though.

The point that Max brings out is this: the engine never dropped a beat and did everything that was expected of it during the 107 miles of the race that the transmission lasted. Max feels that he has proved beyond the shadow of a doubt that the engine is sound and of good design. The future, he adds, should see a lot of these Buick engines reworked and used for competitive purposes.

Oh yes, the car itself. It was constructed by Jimmy Summers 'way back in 1941. Incidentally, Summers was one of the original exponents of the art of *customizing* who practiced the trade long before World War II.

The '32 roadster body is channeled three inches over a boxed '32 frame. The majority of the running gear consists of '40 Ford equipment while the cycle type fenders are altered spare tire covers with supporting brackets to affix them to the backing plates.



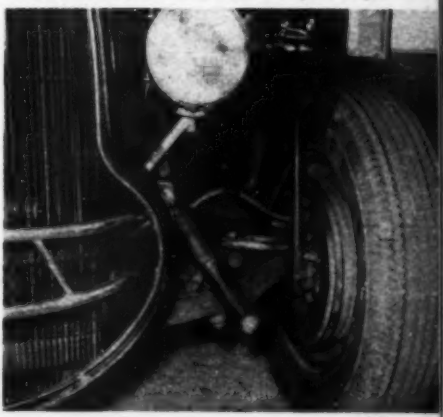
Original dash was removed for added leg room in small cockpit. The large dial is an instrument group from a Lincoln, aluminum panel in center contains 5 W gauges for keeping track of things under the hood. Windshield frame was custom built back in '41 but still looks good.

The roadster as it appeared immediately after the March Air Force Base road race. Fenders and a spare tire brought the bomb within the qualifications of the sports car class. Body is a '32 Ford channeled three inches over a '32 Ford frame. Car was built 13 years ago.

The rear end houses a set of 3.54 gears while the transmission is, or *was*, crammed with cogs from a Lincoln Zephyr. With this equipment and the 270 hp engine which packs a walloping 400 pounds of torque, it is small wonder that the black bomb turned 110 in the standing quarter mile while in road race shape.

Now that the race has come and gone, Max says he would like to continue running against foreign equipment but to do so he would like to keep the Buick engine. That is all to the good as far as everyone is concerned — except Leonard Teitzell. He complains that his Mercury has nothing under the hood and that he's getting tired of riding the street cars.

Wonder who will win out?



The cycle-type fenders are cut down spare tire covers bracketed to the backing plates. Brakes are drilled for reduced weight and for cooling.

FOOD for THOUGHT

Unhappy with your present engine? Try one of these.

OVERHEARD IN a local speed shop: "Why are all our automobile engines so much alike? Sure, there are in-line and V types, but I don't mean that. Why doesn't someone develop an engine, say, that has twin crankshafts or maybe no crankshaft at all?"

Actually such engines as these and some even stranger have been developed. The greater majority of these purely experimental designs were by-passed by engineers and inventors in the constant and never ending search for something a little more practical than the engines currently powering the automobiles of this country.

The possible number of internal combustion, reciprocating engines are many and varied. Even with our present in-line, V type, pancake, radial (aircraft), sleeve valve and two cycle engines the surface has only been scratched. One type of engine, for example, which was later proved to be impractical but which was used considerably about the time of World War I was the Gnome rotary engine – in which the crankshaft was *stationary* and the block revolved around it. Fuel reached the cylinders through the drilled crankshaft. This unusual engine saw a great deal of use in aircraft but it was eventually scrapped for something a little more practical. The sheer weight of the engine's revolving block set up a flywheel action so great that a few of the planes went into uncontrolable spins with the most disastrous results.

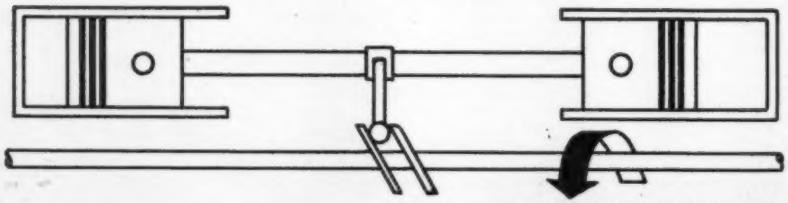
Among the great number of unconventional engines are many which were developed for the specific purpose of testing particular functions. Still others were designed and built by engineers out of pure curiosity – just to see if they would run.

Here are a few of the better known engine types, all of which reached the operational stages and were actually used either for test purposes or to power cars, boats, planes, etc. The accompanying illustrations are not intended to be completely accurate, technical drawings, but rather they are shown here in greatly simplified form merely to give the reader a knowledge of a few *types* of internal combustion reciprocating engines.

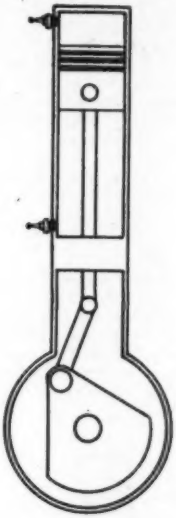
One of the more interesting experimental engines developed some years ago was known as the "crankshaft-less" engine. The working model of this strange engine had two pistons with but a single cylinder and was developed in a concerted effort to lessen crankshaft vibrations. Actually, the term "crankshaft-less" is not an appropriate definition but the rotating shaft was quite free from the usual crank throws as we know them. Instead, the main shaft was equipped with parallel, inclined disks known as wobble plates. The one cylinder was positioned parallel to the shaft and the single connecting rod had a projection which was positioned between the wobble plates. It can be seen that as the shaft rotated the outer edges of the disks appeared to move back and forth. When the engine was running the single connecting rod moved back and forth, thus imparting the reciprocating motion to the wobble plates which served to transform the action into rotary motion. The valve arrangement (not shown) was similar to the present layouts in that each end of the cylinders was equipped with intake and exhaust valves. It is easily seen that the working parts of this engine could be contained in a reasonably small area but the project was eventually abandoned as being impractical for many reasons.

All of us are undoubtedly familiar with the terms four cycle and two cycle. Actually a misnomer, each cycle represents one complete stroke, in either direction, of the piston.

The "Crankshaft-less" Engine.

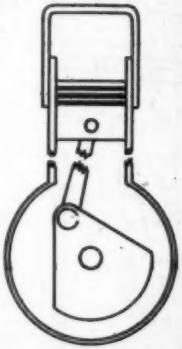


Hence a four cycle engine uses four strokes for each completed work cycle. Two cycle engines are those wherein the piston makes just one stroke in each direction to complete the work cycle. Operating on an entirely different principle than those mentioned, three and five cycle engines have been built and run during the continuous search for improved engine efficiency. The three cycle engine had but a single cylinder while the



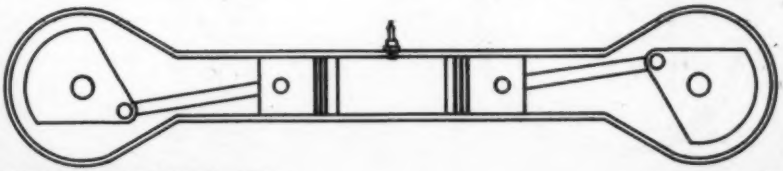
five cycle model had two cylinders. Actually very impractical, these engines had a spark plug both above and below the piston. The connecting rod passed through a pressure-tight bushing and was equipped with a joint so that the reciprocating motion could be transformed to rotary motion as in a common engine. Both the upper and lower combustion chambers were equipped with the usual valve arrangements. It was thought the power impulses would be introduced to the crankshaft more often than in an ordinary two cylinder engine, yet the engine occupied less space. The experiment was later abandoned.

Unlike the so-called opposed, or pancake, engines that power many city buses and a similar engine used in the controversial Tucker car, the true opposed engine was a fascinating piece of machinery. One working model had two pistons, two connecting rods and two crankshafts, but only a single cylinder and one spark plug. The crankshafts were geared together so that the pistons each reached top dead center at precisely the same instant. The single spark plug ignited the gaseous fuel charge and literally blew the pistons away from each other. Each piston completed four strokes for every work cycle — a four cycle engine. The intake and exhaust valves were located in the side of the cylinder directly opposite the spark plug. The top surface of one piston became the "cylinder head" for the other piston and vice versa. Multi-cylinder engines of this type were constructed and run many years ago. One of the experimental engines was, in effect, an eight cylinder model but it actually had four cylinders and eight pistons. A good deal of thought went into this design and it was only after a lot of research and experimentation that it was discarded. Its advantage, compactness, can be readily seen in that a large number of pistons could be contained in a comparatively small space.



A good many variable compression ratio engines have been built in this country and abroad. The chief purpose of this engine is for the testing of fuel and various anti-knock compounds, but experimental rods, bearings, etc., have also been given a workout under any of practically numberless compression

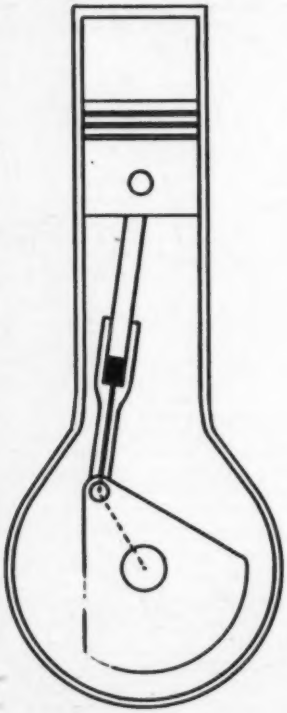
The True Opposed Engine.



ratios. Simply described, the cylinder head can be raised or lowered to any desired position. Most of the engines were adjusted when the engine was not in operation but a few could be changed while the engine was running. Such a mechanism would seem to be easily designed to the casual observer but many seemingly impossible technicalities had to be overcome before the application proved satisfactory. One of the troubles encountered was in the method of raising and lowering the head while the engine was running. The terrific pressures that push the pistons down are also exerted on the inside of the head and try to force it up. The problem was solved through the use of a complicated system of springs and levers. Such an engine would have little advantage in an automobile due to the necessary extreme weight, but the system has proved invaluable for experiments.

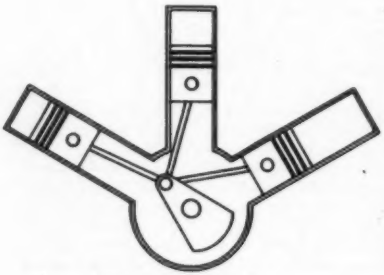
A second form of a variable compression ratio engine is illustrated above. Unlike the first example, this engine is not adjustable at the touch of a dial or the turn of a knob.

The Variable Compression Engine.



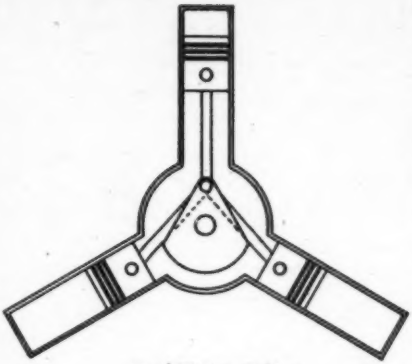
In this case the engine is equipped with expanding rods which elongate themselves with the application of increased oil pressure, due to rpm increase, in the reservoir contained within the rod itself. When this engine was started, it idled with a relatively low compression ratio. As the rpm's were increased the oil pressure was also increased, hence the rods became longer thus raising the compression. The original idea behind this development was to have an engine with a low initial compression ratio providing easy starting, and a higher ratio for top speed running. Like the engine with the movable head, this engine has been used to test bearings, fuels, etc., but other than that it has not progressed much beyond the experimental stage. A great deal of trouble was encountered with this engine. Occasionally one of the rods would lose oil pressure, due to a clogged oil line or similar cause, and the one cylinder would drop compression while the others maintained the higher ratio. Thus unequal forces were created which was usually disastrous to the engine.

Though the three engines illustrated below are not technically of a different *type* than those with which we are familiar, they are a little unusual in the arrangement of their component parts. The first strange engine is termed a W type. It is nothing more than a V engine with an added bank of cylinders.



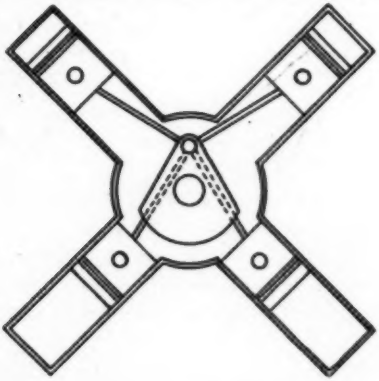
The "W" Type Engine.

Because it has three banks, the number of cylinders may sound unusual to us. For instance, nine cylinders were sometimes used as well as the more familiar sounding six, twelve and twenty-four. The second engine is known as a Y design. Like the W model, it has three banks of cylinders but they are arranged symmetrically around the crankcase. The X engine type has four banks of cylinders and resembles two V engines arranged bottom to bottom and joined by a common crankshaft. The three engines shown here are still used in some aircraft and the design was duplicated in several World War



The "Y" Type Engine.

II tanks. Chrysler built engines during the war wherein two or three of their usual passenger car engines were mounted on a common crankcase. Hence, four in-line engines

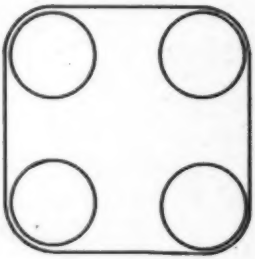


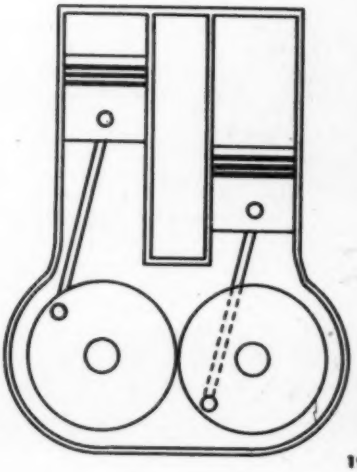
The "X" Type Engine.

could be arranged to resemble the X engine above. One of the disadvantages of the Y and X engine is that they must use a dry sump oil system since the crankcase cannot hold oil in the conventional manner.

During the past few years a lot of talk has been heard regarding "square" engines. The term is popularly used to describe an engine with a bore and stroke of equal dimensions. In actuality, a true square engine does not necessarily include this feature. The square engine is one in which two banks of two cylinders each are arranged side by side with dual, parallel crankshafts. When viewed from the top, the cylinders are arranged in a true square (see below). This engine reached a production output many times greater than the other engines shown here with the possible exception of those used in aircraft. The twin crankshafts were geared to a driving shaft which, in turn, entered a conventional transmission. The remainder of the drive line was similar to our modern automobiles. Several makes of foreign cars were equipped with engines of this design many years ago. At one time this was accepted as being a conventional engine. No good reasons have been given why this method was discontinued other than the fact there were two crankshafts to worry about instead of one. Perhaps an engine of this type prompted the designing of the first V type engine. It would seem possible since someone looking at a drawing of a square engine might have said: "Why not incline the cylinders and use a common crankshaft?" Could be.

The True Square Engine.





Rear corners of hood have been rounded and the seam between the fenders and the cowl were frenched. Quality work is quite obvious here.

After making the rounds of the shops, Jay wound up at Valley Custom in Burbank. Neil Emory and Clay Jensen, partners as well as brothers-in-law, agreed that the faulty work would have to be *undone* then *redone* and gave Jay a lecture for accepting the lowest bid for the metal work.

Thus was begun The Tahitian, another Valley Custom creation that belongs in the same category as Ron Dunn's sectioned '49 Ford and The Polynesian — a custom Oldsmobile currently in Ohio.

Commencing at the rear of the car, the deck lid was re-filled — the right way, this time — and the seams formerly separating the quarter panels and the rear body panels were frenched. In order to french the taillights, the owner had a set of stock '49 Ford lense rims cast in brass which were brazed to the body. The lights and the lenses are inserted from inside the trunk.

The rear bumper was removed and the mounting bolts welded to its inner side. The exposed bolt holes were then filled and the bumper replated, providing an expanse of gleaming metal across the width of the car broken only by the '51 Mercury bracket which serves to frame the license plate.

Jay, being very mechanically inclined, installed electric solenoids in the doors and positioned the outside buttons in a very unusual and novel place. He removed the small Ford crests from the panels separating the quarter windows and the rear window. The plastic medallion was trimmed so it would move freely inside its frame. Ordinary pushbuttons were mounted beneath the crests in the panels, then the crests replaced. As a result the doors open at the slightest touch of the crest's plastic insert. Thus, the buttons are hidden from sight and defy detection, but are easily accessible for entering the car. Pushbuttons were also positioned on the dash within easy reach of the driver. In case of electrical failure, a concealed T-handle will open the right door.

Detail of frenched taillights. '49 Ford rims were cast in brass, then brazed to the fenders and molded. Lenses and lights can be reached through the trunk. Deck is electrically operated.

Door actuating button is concealed beneath the Ford crest. Light touch on plastic medallion is all that is needed to gain entrance to car. System can be locked due to concealed switch.

With no need for ordinary door handles, Valley Custom filled the handle holes without further ado.

The grille shell is from a Canadian Ford which was ordered directly from a dealer in Vancouver. The stock Ford grille was removed from the Victoria and the Meteor shell joined to the front fenders by welding and frenching.

The headlights were frenched, the hood filled and peaked, and the upper hood corners rounded, completing the front of the Vic.

Modifications were started on the chassis by installing one of the Valley Custom's popular front end lowering kits. To even things up, the rear springs were de-arched then replaced with lowering blocks between them and the axle housing. Happily, the car does not look as though someone had piled a ton of bricks in the trunk. Instead, it sits only a trifle lower in the rear than in the front.

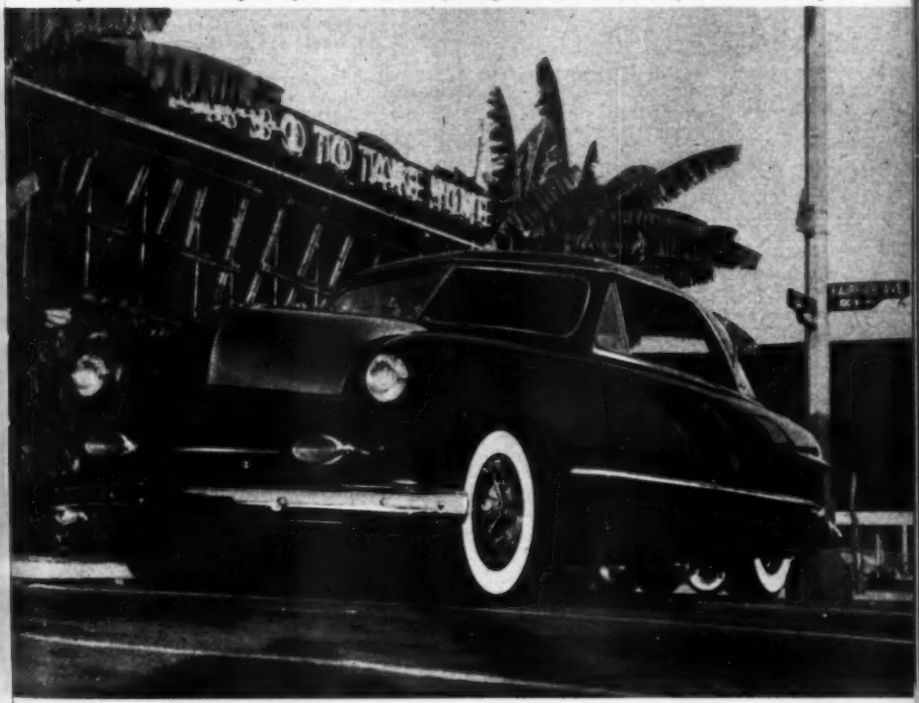
The custom work was concluded with the installation of '49 Ford rub strips (on a '51, yet) and with the adapting of a '53 Oldsmobile upper bumper bar as a grille.

Painting completed the car with the lower portion being a rather interesting shade of maroon which is politely termed Sunset Flame and the upper part finished off in a Golden Mist. Both shades, naturally, are lacquer rubbed out to a high gloss.

Jay wanted still a few more changes to his car to set it off from others like it, so he dug into the engine. The original mill had seen better days so it was replaced with a '52 Ford engine. It was bored to 3 5/16" and a Mercury crank used to afford an added ¼" of stroke. The block was both ported and relieved and fitted with an Iskenderian cam. The flywheel was reduced to a conservative 17 pounds and an Offenhauser dual manifold located which sported a pair of 94's. With a set of Edelbrock 8 to 1 heads, a Mallory ignition, a pair of Belond headers and a couple of 22" Douglass mufflers, The Tahitian was ready to hit the road.

Jay Greer has learned his lesson the hard way and never again will he accept the lowest bid for custom work.

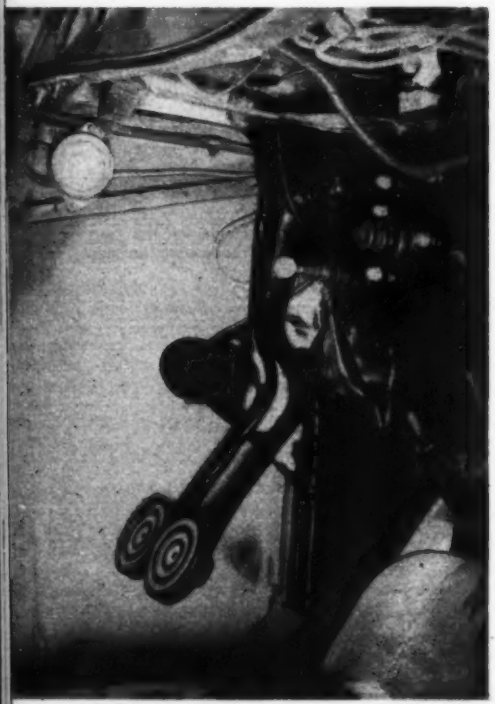
The Tahitian — the car with the South Pacific look — features conservative restyling carefully executed. Lowering is equal fore and aft proving that an extreme drop is not necessary.



Brake and clutch linkage problems solved through the use of these easily built . . .

PENDULUM PEDALS

Text and drawings by Lynn Wineland



Completed installation of the pendulum pedal assembly as seen from its right side below the dash. Pedal arms were bent to necessary shape. Left pedal, clutch, is '39 Ford; right pedal, brake, is '34 Ford. Pedal pads are from a '46. All necessary parts can be obtained from Ford dealers with exception of the slave cylinder. Slave cylinder, operated by left hand pedal but right hand master cylinder, is connected to the clutch throwout bearing below car floor.

ACROSS the nation in backyard garages a multitude of automobiles are being constructed. They are being assembled to fulfill their owners' desires for transportation that is outstanding both from an engineering standpoint and safetywise. When an older chassis is built for *go*, thought should be also given to *slow*, with the installation of an up to date hydraulic braking system. Often the installation of one of the new ohv V8 power plants is attempted with the resulting difficulties of clutch linkage hookups.

Realizing the problems besetting those who are converting cars, ROD & CUSTOM attempts to bring an answer to the clutch and brake pedal question which should satisfy the majority of cases.

The assembly shown on this, and following, pages was built by Doane Spencer of Sun Valley, Calif., as a solution to the many problems he encountered when he installed a '53 Lincoln engine in his '32 Ford roadster. The chief objective was to construct a compact pedal set up which would have positive action, strength, provide trouble free operation and have ease of accessability. To top it off, the assembly would have to correspond to his limited economic budget which meant the majority of the parts must come from old assemblies purchased quite reasonably from auto wrecking yards. The result is the answer to the questions presented and contained but three parts not generally available from a junk dealer and a single part which had to be fabricated from sheet steel.

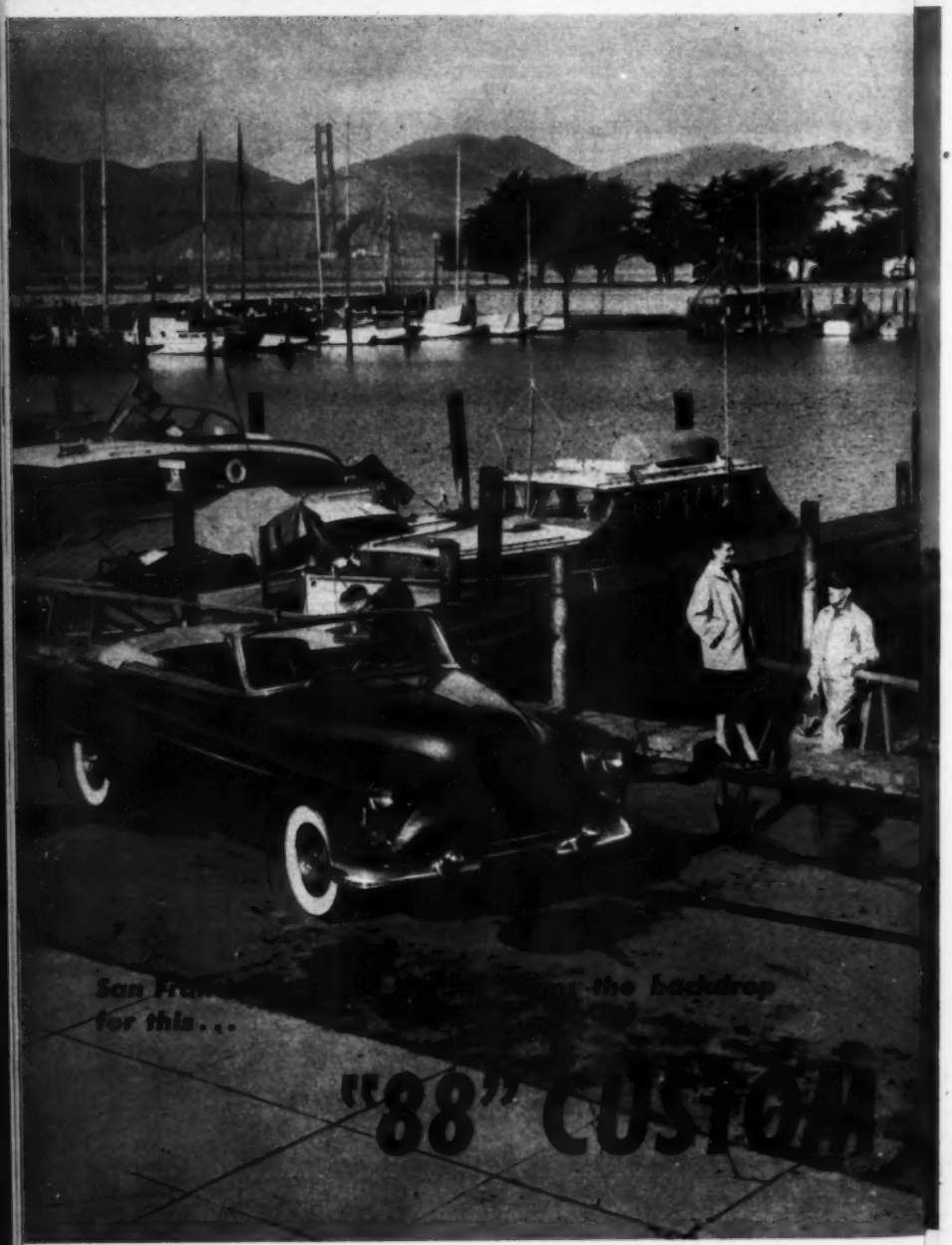
Because of the limited space on the firewall side of the engine compartment due to the great size of the engine, there seemed to be no easy method of linking the planned overhead clutch pedal with the clutch throwout bearing on the Ford transmission. To overcome this problem, Doane turned to a widely used aircraft procedure which, as yet, has seen little use in automobiles. The secret is a device known as a slave cylinder.

The slave cylinder used is nothing more than an aircraft wing flap actuating cylinder

(Continued on Page 54)

An exploded view of the pedal assembly with some of the minor bolts left out for clarity. Some of the more important items are, 1; '52 Lincoln master cylinders, part no. B2-2140-B. 2; '52 Lincoln push rod assembly, part no. LA-2143-C. 3; Lincoln offset shoulder bolt, part no. AB-2462A. 4; shim washers from any Ford-Merc column shift lever assembly. 5; 1939 Ford master cylinder push rod assembly. 6; 1939 Ford cross shaft turned down to ¾" diameter. Size scale is indicated below.

EXPLODED ISOMETRIC VIEW

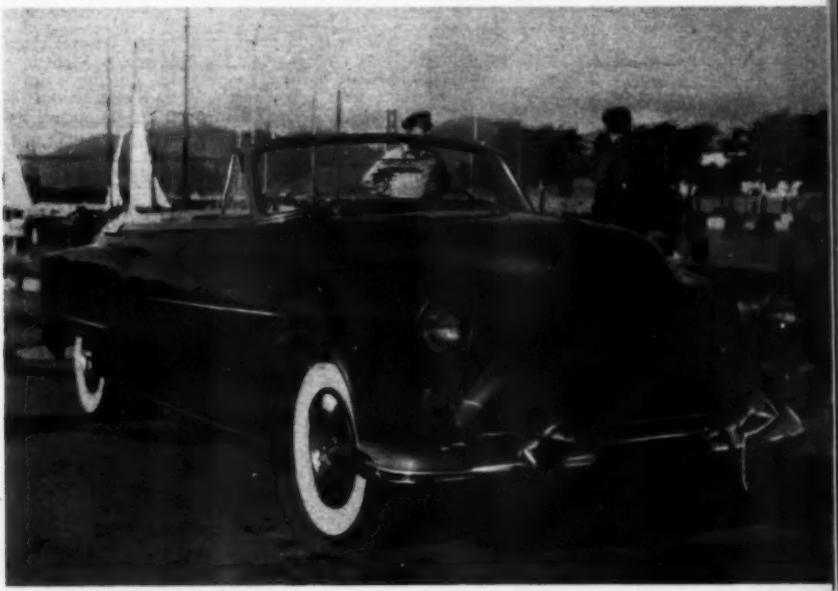

San Fra... ... the backdrop
for this...
"88" CUSTOM

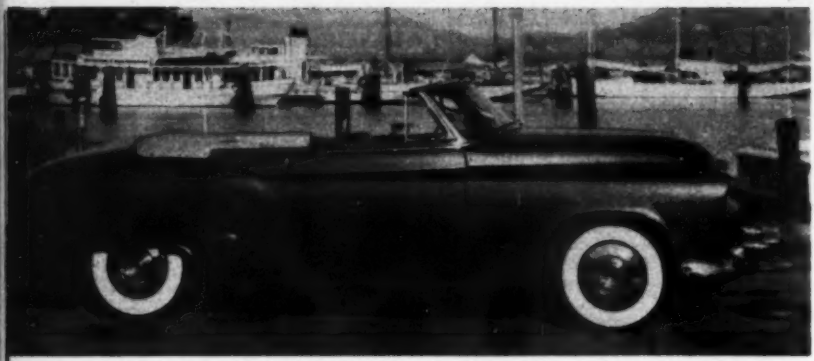
WINTER MAY not necessarily be the best time of the year to drive a convertible, but Don Stone, of San Francisco, apparently doesn't pay much attention to the calendar. However, after last summer had come and gone he decided that his Oldsmobile might be better off in a nice warm custom shop than taking a beating from the chilly and damp weather. He had a general idea of what he wanted done to his '52 convertible so he began looking around to find a shop that would give him quality work in return for his hard earned money. Lundquist Coach Craft seemed to be his best bet, so he took the car there and asked the shop owner's opinion of his ideas. Ted Lundquist quickly whipped up a few sketches of what *he* had in mind and between the two of them an agreement was finally reached. An unusual "bumperless look" was selected for the rear of the 88 while the new "operation shaded headlight" was chosen for the front.

Ted went to work, bound and determined to make the Oldsmobile a decided one-of-a-kind model — which it definitely is. Beginning at the front of the car all of the "stuff" was removed from the hood and the holes filled in. Step II was the revamping of the grille. The original top grille bar was welded to the hood and fenders — thus permanently closing the hood. Owner Stone was unnerved at this, but Lundquist proceeded to hack saw through the bar so the hood could resume its normal action. He explained that this was done to afford the best possible alignment between the hood and the fenders which otherwise might not result had the cuts been made *before* the welding operation. The bar was then molded to the hood and fenders to produce a protruding lip surrounding the grille.

The entire headlight and parking light assemblies were removed from the front fenders before the extending step was undertaken. The slanting, hooded shape of the extended fenders was formed in the following manner. A length of half inch diameter rod was bent to the desired shape of the hood and was affixed to the fender at its lower ends by brazing. The forward slant of the rod at the top left a gap between it and the original fender so this was filled by welding in a hand formed panel. After welding and molding the panel in shape, the fenders took on a rather unusual appearance. The headlight assemblies were repositioned underneath the hood, or shade, and the outer chrome ring replaced — for these lights are not frenched. Below the lamps were put parking lights — lights which formerly provided the interior illumination for an older model Pontiac. The remainder of the gap in the hooded area was

Grille opening features complete lack of usual bars. Fine mesh screen is set deeply in "mouth". Bumper is Oldsmobile with Cadillac guards. The fenders were lengthened by the added light hood.



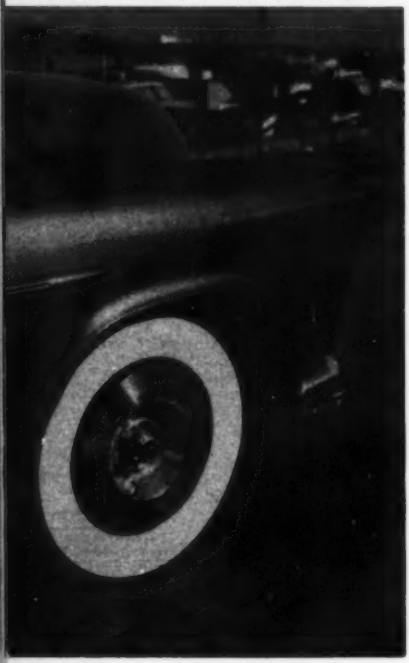


Inherently good lines of this '52 Olds have been enhanced by removal of some ornamentation and by reshaping both front and rear fenders. Good sense was shown by mild lowering in rear.

filled by shaping a piece of perforated, chrome sheet metal through which air can pass on its way to the interior ducts.

In order to keep the car as up-to-date as possible, as far as customizing trends are concerned, a lip was formed around the edge of the front wheel cutouts. At the same time, the chrome trim molding that formerly ran the length of the fenders was discarded and the clip holes filled. The frontal changes were concluded with the installing of a fine mesh wire screen deep inside the grille opening and with Cadillac guards on the Oldsmobile front bumper.

Alterations to front fender include lengthened lines, removal of original trim and the rolled edge surrounding wheel opening. The hub caps are from a 1953 Cadillac with added metal spinners.



Continuing on around the sides of the convertible, Ted took off the door handles and proceeded to eliminate the holes. He then mounted electric solenoids in each door and positioned the outer push buttons beneath the front fenders. They are hidden from sight to prevent curious people from running down the battery by "seeing if they really work," but at the same time they are easily operated by the simple expedient of touching them with the tip of a toe — a very handy arrangement if you happen to have your arms full of bundles.

Like the front fenders, the doors and rear fenders received the molding-removal and hole-filling treatment. This not only included the horizontal side stripping, but the rear fender gravel guards and the sloping sash molding as well. The lips that were formed around the front wheel cutouts were duplicated in the rear. Ted had decided that fender skirts are a thing of the past and wanted to make sure that none would be installed. A wheel, he explained, is a thing of beauty and should be exposed accordingly.

The modern theme of the frontal styling was carried out on the rear of the Olds in much the same manner. The taillights, and the trim surrounding them, was discarded entirely. A piece of steel rod was bent to the shape desired and fastened solidly to the fenders. The gap between the rod and the fenders was paneled in with sheet metal which was welded to the fender metal. This, then,

extended the rear fenders, provided a rolled edge for the extension and shaded the taillights all at the same time.

Into the openings provided at the tips of the rear fenders were set six lights — three on each side. The top light provides for the taillamp, the center one for a backup light and the unit at the bottom is a combination stoplight and turn signal indicator. Like the front, the area around the lights was covered with a sheet of perforated, chromed sheet metal.

An extensive amount of metal work was necessary at the rear, lower edge of the fenders since it had been formerly decided to remove the rear bumper altogether. Normally hidden by the bumper, the trailing edges of the fenders are recessed and notched for the bumper brackets. With these items removed, the fender presents an unfinished appearance which, in this case, had to be reshaped to conform to the overall styling of the car. Immediately below each taillight setup was mounted a fourteen inch length of heavy walled, 4" steel tubing. This was bracketed to the frame itself for maximum strength. Two identical tubing sections were mounted below the deck lid and, through the four of them, passes the exhaust. They also provide protection from careless motorists who love to bump the car ahead of them when parking.

The dechroming work was continued to the deck lid which was fitted with an electric solenoid so the trunk can be unlatched from the driver's seat.

Several pints of metallic were intermixed with a few gallons of green lacquer and the mixture sprayed over the custom Oldsmobile. The color is not unlike one of Olds' original

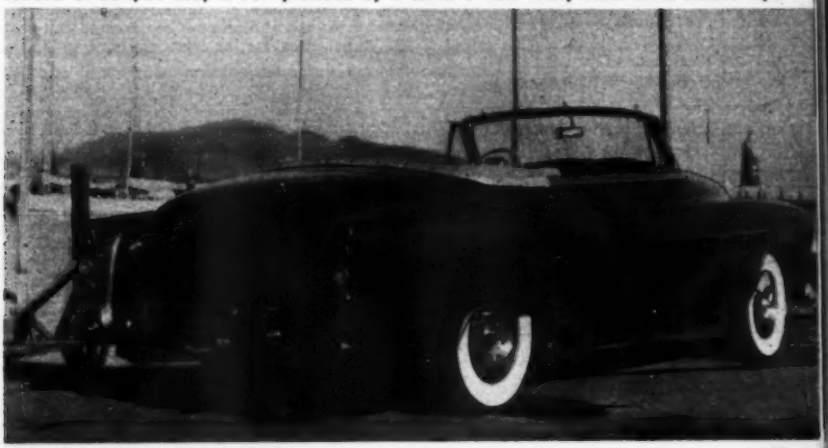
Taillight detail discloses taillamp, stoplight and back-up unit. Note heavy tubing that gives both protection from rear and an exhaust outlet.

shades of metallic green but it has a deeper, richer lustre attainable only by painstaking hand mixing and application which, unfortunately, the factories cannot afford to do.

The interior was completely reupholstered in black Naugahyde and the window moldings chrome plated both for a neat appearance and for ease of cleaning.

Such details as the Cadillac hubcaps, with special, small spinners, and the relocated and shortened side trim completed the modifications to the car and it was returned to the owner. Don Stone immediately set out to see the sights of San Francisco from the comfort of his "88 Custom."

Identity of car ceases at rear. The alterations include reshaping of rear fenders and complete removal of bumper. Body is now protected by a series of four heavy-walled steel exhaust tips.



TEN STEPS TO CUSTOMIZING

By Orin Tramz

Step IX — Upholstering.

IF YOU have been diligently following past installments of this series of articles, your car should be customized or restyled, painted and complete with such exterior accessories as you might have desired. This month our attention turns toward interiors, and we shall give you a brief discussion on upholstery and the reinstallation of the various necessary retaining parts.

Pleats can be worked into door or seat panels in the following manner: The leatherette and the backing material are cut to size allowing for several inches excess at each edge. Then parallel lines are drawn where pleating is desired. Strips of foam rubber are then placed on backing, one at a time, and the materials stitched together. Pleats can run horizontally or vertically, whichever you might desire. Upholstering is hard, but can be done at home.

Throughout past Steps, we have stressed that you do as much of the work yourself as you possibly can in order to keep overall expenses to a minimum. Upholstery, too, can be done at home with a sewing machine and with a few stitching hints from your mother or your big sister.

Before you go ahead and start selecting your material, there are a few things yet that need attention. First of all, all of the larger panels such as the turret top, door panels, quarter panels and deck lid should be undersealed. This deadening material should also be used at all of the body joints where two adjoining panels are united. This will prevent air or water leaks and give you a warm, dry driver's compartment. Any auto parts store or garage will gladly sell you a quantity of undersealing material for a nominal fee. Two gallons should be enough to keep you busy for awhile. A putty knife, or a section of stiff cardboard, can be used to evenly spread the deadener. Apply an even layer of the mastik, approximately 1/8" thick, over the underside of the top and allow it to dry in a well ventilated area for at least an hour or so. An

insulating fabric, popularly called "waffle paper" can be obtained from a parts house and, when cut into sections approximately three feet square, can be applied over the undersealing material. This will assure the driver of a car that is quiet and heat and cold resisting. If you should overlook this step your car will probably sound like a bass drum the first time you drive it in the rain.

The same procedure should be followed on the other panels as mentioned, using smaller squares of the waffle paper. If you happen to run across any glass fiber material, use this either in place of the waffle paper or in addition to it and your car will take on a silence that you wouldn't have believed was possible.

Using a putty knife and strips of deadener material coated with underseal, caulk all of the joints between the cowl and the floor and between the body side panels and the floor. While you're at it, check carefully to see that you have no metal to metal contacts that are not welded or sealed. If you have, you will probably hear a lot of torsional groans and squeaks whenever you encounter a rough road. In an earlier installment, we warned you against this so if you overlooked it previously, take care of it now. Car noises are telegraphed throughout the body and are difficult to trace to their source once the upholstery has been installed. You can check for these sounds without leaving your driveway in the following manner: Rock the car from side to side by pushing on a corner of either bumper. This will produce a twisting force to the car much the same as would be encountered in normal driving.

While you have the caulking compound or underseal handy, seal all holes in the firewall to prevent engine odors from drifting through. Pack the stuff around wires and cables where they pass through the metal panel for the same reason. If your car is equipped with a cowl vent, see that it is thoroughly water tight, particularly around the water drain hole.

Your next operation should be the installation of the gimp or nail strip (also called tack strip). This is the heavy, cardboard-like material to which the interior upholstery is tacked. Most cars have a metal channel running around the doors and above the windows in which is fastened the tack strip. If any of the stripping is missing, more can be obtained from your car dealer or from a wrecking yard if you want to dig it out of a junked car. There is no good substitute for this material, so be sure and use only the material as was originally supplied with the new automobile.

The roll of material that is nailed directly to the tack strip and which runs around the inner edge of each door is called the windlace. Its purpose is to act as a weatherstrip similar to that which is used in houses to prevent the leakage of air or water around doors and windows. If your original windlace is worn, new material can be obtained from an auto upholstery shop. Secure the windlace to the tack strip using small carpet tacks. Be sure that the windlace is long enough to completely surround the door and with enough left over to tuck beneath the ends of the door sill or step plate. This will insure a tight fit between the door and body.

Before proceeding with the headliner, which should be the first upholstery installed in a gutted car, check the operation of the dome lights and be sure that the wiring is in good condition. A worn or frayed wire insulation could start a fire, you know. We'd hate to see you lose your car after having worked so long on it!

New headliners can be fashioned from broadcloth, plastics or a variety of similar materials. If your original headliner is around, notice that it is not a single expanse of material. It is composed of individual panels which are joined by sewing with an inserted loop of material through which the headliner bows are passed. Headliners can be purchased from specialty shops for from nine to twelve dollars if you desire nothing spectacular in the way of colors or fabrics. If you wish to sew the panels yourself, your old headliner can serve as a pattern — if you

A striking design theme done in black and white. Pleats and the roll-around edge of seats were all padded with layers of foam rubber. Price of job like this at shop would be close to $300.00, but can be done at home for much less.

Interesting design was carried out on door of a sectioned Ford. The inner, pleated panel is white while the harmonizing surrounding panel is beige. The sections are divided by beading.

haven't altered the shape of your turret top.

Headliners are installed in the following manner: Place the retaining headliner bow clips in the proper slots. If you followed the instructions outlined in an earlier installment of this series, each headliner bow should be marked as to its precise location. Seldom are two bows the same and each have a definite position. Place the bows through the loops of the headliner and secure them to the car. Check the headliner for proper fit by holding it against the upper windshield frame and against the top of the rear window. An excess of material is alright but don't attempt to trim it off until the headliner has been completely installed.

If your measurements were taken carefully and the headliner fits as it should, begin the installation by securing it over the windshield. If your car has a tack strip for this purpose, tack the headliner to it. If not, secure it with 3M trim cement. After allowing for a short drying period of the cement, repeat the operation at the rear of the car being sure that the liner is as free from wrinkles as possible. When the ends have been secured, attach the headliner along each edge in much the same way. Minor wrinkles or slight sags of the material can be eliminated later, just be sure that they are minor and the headliner is not hanging in folds.

Headliners can be stretched after installation by leaving the car standing in the sun with the windows rolled up. A little moisture applied to the headliner with a sponge will shrink it almost beyond belief. As evaporation takes place, the material will free itself of wrinkles and sags and the job will become professional looking.

The package tray immediately behind the rear seat can be easily re-covered by removing the old material and covering with the new. Leave enough excess to allow the edges to be turned under the cardboard base and to be glued or stapled in position.

Door panels can be made very attractive using a little imagination and patience. Select the type and shade of materials you want and work out a two-tone design if you desire. Be sure that the material is larger than the fibre panel to allow for overlapping the edges. Sew the adjoining panels together on the sewing machine then lay the material over the panel to check its size. By placing the material face down and the panel over it, marks can be made through the handle holes so cuts can be made in the fabric. When you have cut holes for the passage of the necessary handles, glue or staple the material to the panel by lapping the edges. Kick panels and quarter panels can be covered in the same way. If you wish, a two-tone dividing line can be covered with a strip of chrome trim. This will enhance the interior of your car and cause the job to look very professional. Many of the older, expensive cars had pleasing interior chrome trim and these can usually be found at the local wrecking yard.

If you have always envied the luxurious feeling of a deep, soft carpet in the more expensive cars, your job can have the same floor covering at a fraction of the cost, and here how it's done:

Run down to your nearest carpet or upholstery shop after determining how much material your car will require. Most shops have excess material cut from rugs installed in homes and usually the management will be glad to get rid of these pieces for a small sum. Unlike the carpeting in a home, an auto carpet must have irregular contours in it as it passes over the driveshaft tunnel and the transmission housing. Therefore, you can't just lay the material on the floor and tack it into place. Using your old mat as a template, cut the various sections from the new carpeting as needed. It may require a little heavier sewing machine than the one you have at home to do the job so run back down to the upholstery shop and have them do it for you.

While you're at the shop, see if you can talk the foreman out of some of the undermatting used in most houses beneath the carpeting. This can be placed on the floor of your car below the final carpeting and give you a luxurious feeling rug. Both the undermatting and the carpet can be tacked in place using drive nails which may be obtained from your upholsterer.

Re-covering seats is not a difficult job, but it may give your patience a good working over before the project is completed. It is not necessary to remove the original material from the seats since this will serve to hold the cotton padding in place. Choose the colors you desire and stitch the panels together as required. The material is held fast to the seat frames by the use of "hog rings" which are obtainable from a parts store. If you don't wish to tackle the actual designing and sewing job required for the seats, consider installing a set of quality seat covers yourself. You can save a considerable amount of money by doing as much of the labor as you can yourself, the base price of the materials is usually relatively small.

If the interior of your car has again resumed its normal upholstered condition, it's time to clean up the little details and go out and get some enjoyment after the month's-long work that you have suffered through. Before you take off, though, you'd better replace the window moldings now that the upholstering is completed. These moldings sometimes spring out of shape when removed and will require a little hassling to replace. The job can be simplified by using an ice pick or other sharp-pointed instrument to line up the screw holes. When installing the moldings for the windshield and back glass, remember not to tighten the screws too hard. Just snug them into position or you may wind up with a shattered piece of glass. The glass is mounted in rubber to allow flexing over rough roads so don't eliminate this feature by securing the moldings with all of your strength.

Padded dashboards are coming back into vogue after having been only an oddity since the twenties. For heaven's sake, don't use a loud or gaudy material for this job. A plain shade of leatherette will suffice since padded dashes are meant to be functional, in case of accident, rather than ornamental. A dash can be padded in the following manner:

If your dashboard has a chrome dividing strip running horizontally across it, you're in luck. If not, dig up a strip some place and prepare to mount it on the dash. This will form the breaking point between the padding and the lower, metal portion of the panel. The strip will serve to secure the edge of the material and prevent it from fraying or coming loose. Remove the garnish moldings from around the windshield again. Obtain a piece of sponge rubber large enough to cover the area and cut it to shape. Cut any holes needed in it to allow for projecting knobs such as the windshield wiper control, etc. Cover the dash and the one side of the sponge rubber with trim cement and lay the rubber in position. Cut the leatherette to size and similarly cement it along the top edge of the dash and replace the garnish moldings. The moldings will help to secure the padding. (See illustration.) Pull the material tightly over the surface of the sponge rubber and cement it at its lower edge. Install the chrome dividing strip and the job is completed.

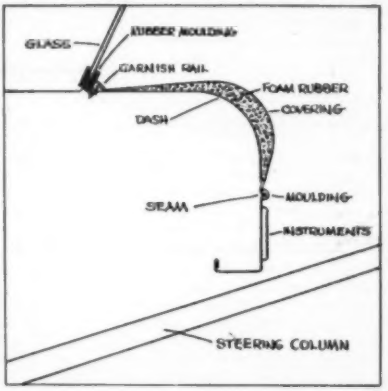
Next issue will be the conclusion of this series of ten articles and in it we will briefly discuss lowering. Lowering in detail has been covered in several foregoing issues of ROD & CUSTOM, so avail yourself of the back issues for references will be made to these magazines.

A complete summary will also be given just in case your customizing job is trailing the articles by several months.

We'd like to generalize on a discussion of how to act with your newly customized car but space will probably not permit this. However, a little practice will teach you how to get in and out of steep driveways if your car is all but touching the ground.

Seriously, though, your completed car should be a source of deep satisfaction to you, particularly if the majority of the work was done by yourself. Your friends should acquire a new respect for you and above all, your job should be the envy of your entire neighborhood.

Cross sectional sketch shows dashboard padding. The leatherette is both glued and clamped in place by window molding at upper edge and by glue and molding at lower edge. The padding is of foam rubber cut to shape and cemented to dash. Padding can be very functional if needed.



Photos by Don Hudson

QUALIFIER CHAMPION...

...Family Style

By Lynn Wineland

AN OUTSTANDING group of auto enthusiasts, in a region where such organizations are seemingly as numerous as flies 'round a honey jar, is the Qualifiers Club of Norwalk, Calif. Being located close to the Pomona and Santa Ana drag strips, almost any Sunday will find members of the club at either or both of these courses. The well constructed cars of the members generally take home trophies for beauty as well as for elimination of competition.

One such example of Qualifier craftsmanship is Johnny Bierfeldt's channeled '32 Ford roadster. Like the other members of the club, John is a family man and constructed his car from the ground up consuming many months in the process. It was difficult at first, but as his enthusiasm rubbed off on his wife, Madge, and his two boys, it was possible to do a little scraping from time to time on the family budget to provide those badly needed parts.

The meager beginning was a roadster body and a set of '32 frame rails. Fortunately, the metal was smooth and sound, so body work was necessary only where changes were desired, such as filling the cowl vent and the outside door-handle holes. All the unnecessary holes in the frame were filled for neat appearance. The decision to channel the body seven inches over the frame resultd in the body supports being unaltered. The supports were left intact for if a change was ever made and the body replaced in its normal position it could be done with little effort.

The dash panel came in for its share of beautifying when it was filled in solid, then chromed. A minimum of instruments were used along with a hand fuel pressure pump.

As work on the rod progressed, so did the education of the family. The boys, Steve and Denny, learned to pass Daddy the torque wrench when it was asked for, and to Madge the term carburetor became as much of a household word as orange juice.

The front suspension and steering assembly were installed, both basically '32 parts, with a 2½" dropped axle. Later on came the '41 rear end with 3.78 gears and a shortened driveshaft. Tube shocks were installed in both the front and rear. The original '32 pedal assembly was shortened four inches and remodeled to accommodate a master cylinder for pushing the juice out to the '46 Ford backing plates and drums. Fitting the brakes to the '32 spindles was accomplished by filling in the backing plates and drilling new mounting holes. Sixteen inch, '40 Ford wheels are found at the four corners with 5.00 ribbed racing doughnuts up front and 7.00 ground grabbers behind. The rear wheels were offset for greater tire-to-body clearance.

The bi-weekly meetings of the Qualifiers are held at members' homes, so Johnny got

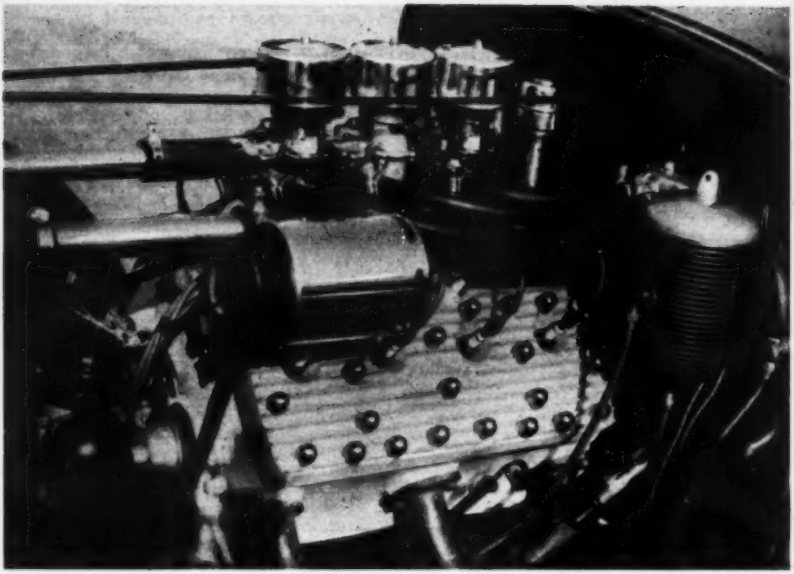
a lot of suggestions and advice when the fellas dropped around for the meetings at his place. Many of the members possess special skills which were utilized in building the car, and in turn the Bierfeldt mechanical know-how was put to use on other cars.

To comply with the local fender law, a '36 Ford spare tire cover was cut in half to cover the front tires. The rear shields are also tire covers, but from a Buick. The wider Buick covers do a perfect job of covering the big rear tires and are supported by heavy strap iron braces mounted directly to the rear end. The front bumper is from a '49-'50 Ford grille guard bolting directly to the frame horns. The rear bar was made of ⅝" bar stock and chromed. It supports the Qualifiers club plaque and affords ample protection for the license and the '39 Ford taillights mounted in the rear body panel.

The '32 radiator was put in top-notch condition with the regular filler closed over and a pressure cap mounted at the back side of the top tank. The grille shell was then nosed off in the popular style and installed. In order to avoid the cost of another core or altering the stock one, the radiator was moved forward and lowered between the frame horns. Because of the added distance between the cowl and the shell, an aluminum hood was made in three sections, louvered, and trunk latches installed to hold it in place.

When the body and the chassis neared completion, the Bierfeldt family began to think in earnest about the empty space in front of the firewall, and how to fill it. The conversation across the supper table began to include numbers, such as: 296, ⅜" by ⅜", 3 5/16" by 4", and other numbers preceded by dollar signs. It was the value figures that finally dictated the engine to be used — a '40 Ford block. It was hogged out to 3 3/16", a standard Mercury size. The crank is a Merc with a ⅛" stroke, giving a total displacement of 247 cubic inches. The block was gifted with the usual port and relieve job and all parts of the engine were dynamically balanced. The cam is a Super T by Harman and Collins. Three chromed jugs squat placidly on an Evans manifold and are fed by an electric fuel pump mounted near the '32 gas tank which was relocated inside the trunk. The Edelbrock heads give a compression ratio of about 9 to 1, and a Spaulding ignition provides the spark. The exhaust escapes

Head-on view of channeled '32 roadster discloses quality workmanship. Sparing use of chrome kept construction costs to a minimum. Bumper bar is from a late Ford grille guard.



1940 Ford engine displaces 247 cubic inches, contains such equipment as Edelbrock heads, H & C cam, Evans manifold and Clark headers. Expenses have been kept to a minimum here.

Fellow club member, Don Hudson, is responsible for the black and grey interior. 1932 dash has been completely filled in and chrome plated. Note hand pressure pump in center of the panel.

through a set of Clark headers.

Despite the comparatively small size of the engine, the torque delivered is downright nasty. As it comes off the Schiefer aluminum flywheel, it passes through a 26 tooth Lincoln gear system in a '34 Ford case, and finally greets the concrete, hurtling the rod on down the roadway.

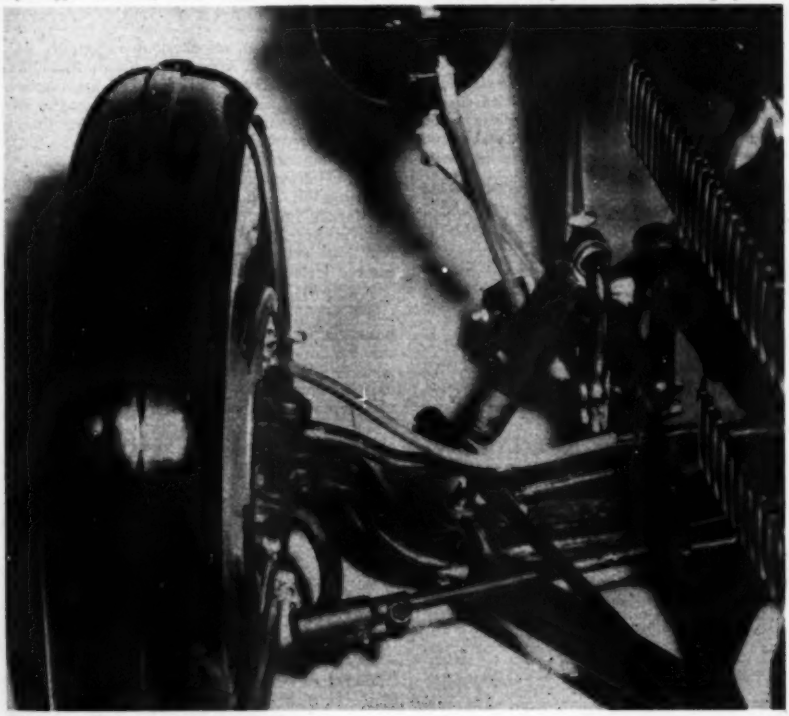
There's no wonder that when the little machine was finished and rolled out into the sun that all members of the family felt proud. Hadn't they helped? Members of the Qualifiers were justifiably proud, also. Bart Root had put on a glistening black body color with a touch of red at the wheels for contrast, and Don Hudson had done a flawless job on the black and grey upholstery and on the floor mat.

The car was pointed toward Pomona one Sunday, tuned to perfection and eager for a try at the clocks. Arriving late in the day, it was discovered that qualifying runs were over and eliminations were in progress for the regional championships. Johnny decided to run anyway, without the benefit of any trials for adjustments or changes. The roadster was weighed in at 2300 lbs. and assigned a number and a class.

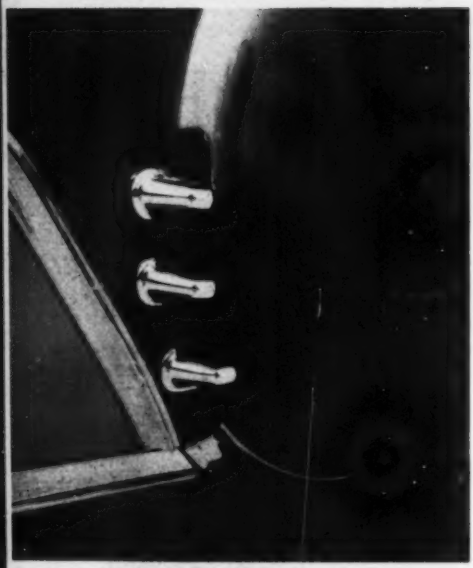
The first rival car was paired off with the newly built Qualifier and the green flag fell. As the 7.00's bit into the asphalt, the deuce jumped — about 1320 feet — leaving the other car like it was tied to a post. Other runs were made with similar results and at the end of the day a large championship trophy was presented to John Bierfeldt — and his Qualifier Champion.

This could have been the happy ending of the story, but there's more to tell. The living room of the Bierfeldt's home is well stocked with golden souvenirs of Sunday afternoons, and all are polished and dusted with care. The roadster, too, is kept well groomed and the budget is touched occasionally for an item like the chromed generator or the aluminum headlight brackets. So, as the car continues to become more outstanding and respected, the Bierfeldts can be proud to say that it was built — Family Style.

Basic components of front assembly are '32 Ford parts. Axle has been dropped 2½ inches. Cycle-type fenders, made from tire covers, are mounted directly to brake backing plates.



THE BARRIS KORNER



The rear fenders on '49 through '52 Chevrolets are practically asking to have scoops cut into them. After the removal of the gravel shield, the planned design was duplicated on fender edge and the cut-out completed with a torch. The roughly cut edges were then finished off and the project completed with use of teeth.

Need some air? Scoop it in!

Text and photos by George Barris

TO BE efficient, an airscoop need only be an opening in a panel to direct the flow of air to either the brakes or to an engine compartment. However, they can be made to be attractive and to enhance the general lines of the particular car. Size is of little importance when their value lies with appearance as on a kustom, as against similar functional openings on a sports or race car. The chief limitation for actual dimensions is tied in with proper proportioning. Simply stated, the size and contour of the body panel to be altered determines the size of the airscoop.

For further appearance value, airscoops can have grille work or attractive chrome paneling which can also add to the lines of the car if properly executed. If at all possible, a scoop should conform with already existing contour lines so as to not appear out of keeping with the overall styling theme. For example, the rear quarter panel airscoops on the sectioned 1948 Studebaker sedan matches a contour line that continues into the top. At the same time, the base line blends into the quarter panel dividing line. (See illustration.) The functional scoop was made additionally attractive by the use of three large chromed "teeth".

When undertaking a job of this type, it is necessary to first determine the size and shape

No evidence of difficult task is noticeable on completed Jaguar airscoop installation. The functional scoop directs air to rear brakes. Several chrome teeth were added for appearance.

Sectioned 1948 Studebaker sedan receives air-scoops in top edge of quarter panel. Half inch diameter rod is bent to the desired shape, then welded to the fender panel. Careful consideration was given job before it was undertaken.

Quality workmanship resulted in this pleasing design. (Compare with preceding photo.) Teeth were added to make scoop one of outstanding design features of the car. A finishing touch was the addition of electrically raised aerial.

of the scoop opening as well as its location on the car. A close check will reveal whether any structural body components will interfere with the scoop at that exact spot. If so, the body bracing can be altered to permit passage of an air duct. If not, decide on a second location for the modification. As the accompanying photos will show, work on the Studebaker was started by cutting the body panel with a torch, then adding a pre-shaped section of ½" diameter rod. This formed the leading edge of the scoop and at the same time provided a strong brace to which to attach the upper part of the severed metal section. A metal duct was then formed and installed in the back side of the panel which narrowed down into a tube directing air to the rear brake assembly of the car.

Additional scoops were similarly formed in the front fenders and the hood panel of the same car in much the same manner. In the interests of uniformity, teeth-like bars were positioned in the frontal scoops as in those at the rear of the car.

Bob Hirohata's '51 Mercury, which has been used to illustrate specific detail work several times in past issues of R & C, is again used as an example. The scoops in the rear quarter panels of this car serve a two-fold purpose. A cooling blast of air is ducted directly at the brakes since the car is so radically lowered that the units could otherwise overheat. Secondly, they serve to break up the slab-sided appearance that this car had before the scoops were added.

Actually more useful on a sports car than on a kustom, scoops added to competition cars can be equally attractive if a little forethought is given the matter. Accompanying photos show strictly functional scoops being added to a Jaguar at the top of the fender line immediately behind the door opening. The operation was performed similar to the job on the Studebaker described above. The area to be fitted with the scoop was slit with a cutting torch and the rear section of the cut raised. The forward paneling was lowered

(Continued on Page 58)

Again we can see that quality workmanship is necessary in a job of this nature. Comparing this photo with stock Stude reveals great amount of welding and leading that was done. Scoop on hood cools the engine compartment.

Those Little Things *That Add So Much*

Headlight and exhaust hints for customs.

A custom, according to Noah Webster, is something that is made to order, or especially created for a specific purpose. That quite aptly fills the bill for custom automobiles or for *usual* cars that have been *unusually* treated. Without further ado, we find ourselves in the midst of our regular monthly feature, "Those Little Things That Add So Much".

There is more than one way to skin a cat, or to customize an automobile, for that matter. Because of this, we like to repeat little customizing hints providing they are done differently than those previously illustrated. It you have done a little something to your car which you think is worthy of mention, shoot it along to us for quite possibly some one else can use your idea to good advantage.

HOW MANY times have you driven into a driveway, or backed into a curb, and heard a *crunch* from the rear of your car? Chances are it has happened to you several times and you have become just another owner of a custom with a smashed exhaust tip. Many enthusiasts have overcome this failing by installing their exhaust extensions to protrude through the bumper. This is fine and dandy – except that the chrome of the bumper around the tip generally becomes discolored and stained due to the corrosive effect of the exhaust gases. Going the bumper-exhaust addict one better, the builder of this Plymouth custom has extended his tips through the rear fenders *above* the bumper, thus serving a two-fold purpose. One: the bumper does not become corroded and, two: the pipe is in no danger of being smashed between the bumper and the pavement. An ordinary exhaust tip was fitted with a shaped collar and the whole unit chrome plated. A hole was then cut in the fender in the desired location and the tip mounted. Lastly, the exhaust pipe was routed inside the fender.

The Valley Custom Shop in Burbank, Calif., always seems to have something just a trifle different up their sleeves. Witness this unusual exhaust installation on a restyled 1952 Lincoln. The car was first fitted with dual pipes, the ends of which were routed up inside the lower edges of the rear fenders. The extreme ends of the pipes were then capped off so that no exhaust could escape. Then, four short lengths of tubing were welded to the tailpipe and holes cut so the exhaust would escape from the sides of the pipes. The four short extensions were then capped with special chrome tips which were fitted into holes in the rear fenders. As a result, the exhaust now is routed through eight separate tips, four in each rear fender. The tips themselves were made of short lengths of tubing welded to Ford parking light rims after which the eight items were chrome plated. The exhaust outlets add not only distinction to this car, but they cannot be damaged by steep driveways nor can they cause corrosion to the bumper. Many cars could be similarly treated.

In previous "Add So Much" columns we have shown example after example of various ways to french a headlight. Some lights we have shown have been tunneled, some have been shaded while still others have been mounted flush with the extended portion of the fender. The radically restyled front end of this '48 Ford convertible has had, among other things, the upper portion of the fenders extended forward to provide an overhanging lip of metal above the sealbeam units. A considerable amount of reworking was necessary to do this since the general contour of the fender had to be continued so the extension would not appear out of keeping with the remainder of the car. This effect was created by tipping the headlight rim forward to the desired position, then adding a small section of body metal to fill the gap between the fender and the rim. The metal was then welded to the fender and to the rim and the whole thing finished off with a quantity of exceptional craftsmanship. Like similar frenched headlights, the bulb units are now removable from beneath the fender which presents an adjustment problem. However, customizers don't seem to be concerned with such minor effects as this, so long as the completed appearance is to their liking.

Just a few of the many ways to add that "certain touch" to your custom or hop-up.

For those who want to change the original design of their headlights but who do not wish to french the lights, here is a sample of what can be done. Believe it or not, the fender section shown is part of a 1949 Ford. The difference in appearance, of course, is due to the Studebaker headlight rim which contains a parking light. In this particular instance the entire frontal section of the Ford fender was cut off and discarded. In its place was fitted the forward half of a Studebaker fender. The joint was hammer-welded together and finished off so that no sign of the metal work remained. The hood edge of the fender needed a bit of work before it matched the Ford line but this, too, was accomplished and the metal work hidden by several coats of lacquer. Therefore, the fitting of the Studebaker headlight rim did not present any questions since both units were from the same car. If you do not care for the "pointed" look of the '51 or '52 Studebaker fenders, similar adaptations can be done using a fender portion from yet another car. What else is customizing but the addition of one car's parts to another car? Just in case you might wonder from whence it came, the grille on this Ford was borrowed from a 1953 Chevrolet and needed but minor alterations to fit the grille opening.

HOW LOW CAN YOU GET?

It took more than lowering blocks on this Bel Air.

Rear end features absence of chrome except for '53 Oldsmobile bumper. Taillights are frenched Studebaker lenses. Rear is lowered ten inches and frame was arched same amount for clearance.

THREE HUNDRED miles north of Los Angeles there lies a small town by the name of Modesto. Nothing very exciting ever happens there. The trains come and go and great trucks roll through town on their way to San Francisco, Sacramento and points north. Service stations, motels and cafes comprise a good percentage of the town's industry and the businesses vie for trade along the heavily traveled highway. Surrounding the town one can find cattle ranches, dairy farms, citrus groves and, stuck 'way back in a small corner within the city limits, there is — you guessed it — a custom shop!

Gene Winfield opened his shop just a little over a year ago but has already pretty well cornered the restyling market for that section of California. Gene is sort of an all-around guy. He builds hot engines, reworks chassis, drives in the local stock car races and takes care of a lot of hole filling, headlight frenching and grille altering.

Take Jim Musick, for example. He had a 1950 Chevrolet Bel Air. After cruising around town in a purely stock looking car for a long time he decided it was time to do something

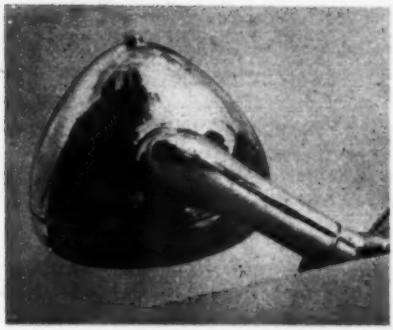
Removal of side trim causes car to appear much shorter than it was originally, so hand formed contour line was added to front fender. The two tone combination is pink and black surfacer.

violent to the easily alterable, well proportioned body. Searching out a reliable custom shop presented no problem, for Jim knew that Winfield's shop would do the job quite capably but inexpensively.

Jim wanted his car as low as it would possibly go so Gene stuffed a set of lowering blocks under it. Jim wasn't happy, so Gene de-arched the springs. Though the car now hit bottom at the slightest provocation, Jim wanted it still lower. In desperation Gene tore the trunk flooring from the Chevy and built a *ten inch* kick-up on the frame. Now the car didn't exactly hit bottom, but the tires rubbed on the rear inner wheel wells. Gene raised the wells as high as possible and reshaped them for even greater clearance. Now the car didn't hit in the rear – but the driveshaft bumped on the body floor. Gene proceeded to raise the shaft tunnel and clear away everything else within the vicinity of the driveshaft and rear axle assembly. Now that the car presented a bump free ride – Jim wanted it lowered some more. The original blocks came out and a pair of the four inch variety went back in their place. Though the springs had been de-arched, Gene re-rolled the eyes. After several months of this sort of thing Jim finally had the ground clearance he wanted in the rear but the car sat at about a forty-five degree angle. Gene lowered the front suspension by reworking the lower A frames and raising the upper spindle arm. This resulted in a frontal drop of about four inches so Gene at last had a well satisfied customer for the time being.

Then came the time for a little custom body work. Out came the original grille, first of all. Gene took the top bar and welded it to the hood and with odds and ends from around the shop he formed the sides of the new grille opening. Just what to use for grille bars had everyone in the neighborhood stumped for awhile, but a solution finally arose in Gene's mind. He acquired a late Willys top bar – complete with the W – and cut it in half. A two inch section was removed and the halves rewelded together. This, then, formed the new lower grille bar and the inverted W stands for the owner's last name, Musick. For a top bar, Gene cast about until he discovered a late model International

Lip surrounding grille opening is actually top bar molded. Grille is composed of bars from a Willys and an International truck. Other front alterations are frenched headlights, removal of hood ornamentation and the extreme lowering. Lacquer paint job is soon to be applied.



Actuating buttons for door solenoids are set in the tips of the spotlights. Electric switch beneath grille locks system when car is parked.

Oldsmobile bumper was positioned lower on frame for added low appearance. Ride of car is not affected to an extreme—unusual for a custom.

truck grille bar. With a two and a half inch section removed from its center it fit quite nicely into the reworked Chevy grille opening.

While the grille was receiving its alterations, the headlights got the frenching treatment and the lower corners of the hood were rounded. The originally slab-sided front fenders received a contour line which runs from the center of each headlight to a point midway over the wheel cutout. This was accomplished by a lot of painstaking metal hammering and filing.

The chrome side trim was removed from along the length of the car and the mounting holes filled. The door handles, too, underwent the same treatment. The doors are now electrically operated with the outer actuating buttons being located in the tips of the spotlights in the best of custom tradition.

Someone advanced the thought that the rear brakes could conceivably become overheated since a great deal of the wheels were now covered by the fenders. Without a second thought, Gene cut a fine looking set of airscoops into the leading edges of the rear fenders. At the present time a set of "teeth" are being made for the scoops and will soon be added to the car.

Continuing on around the car, Gene took everything removable off of the rear fenders, the deck lid and the rear lower body panel. All of the resulting holes were duly filled in, including those of the taillights. A '53 Studebaker hardtop provided the latest in taillights and the lenses were set into openings provided at the rear tip of each fender. The trunk latch was equipped with an electric solenoid and the gas fill pipe was concealed behind the license plate in keeping with the latest developments. The plate now folds out of the way, via a Ford bracket, for access to the opening.

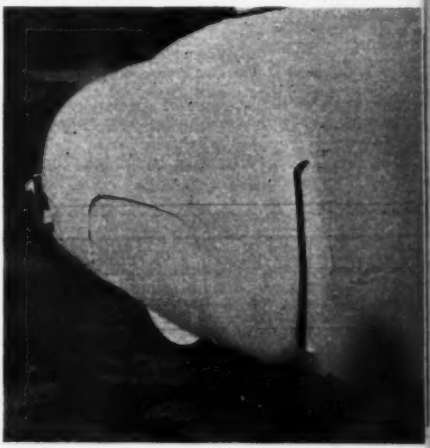
A bumper from a '53 Oldsmobile was used for the rear of the Chevy and positioned slightly lower than the original bar. This was done so the car would appear lower than it actually is!

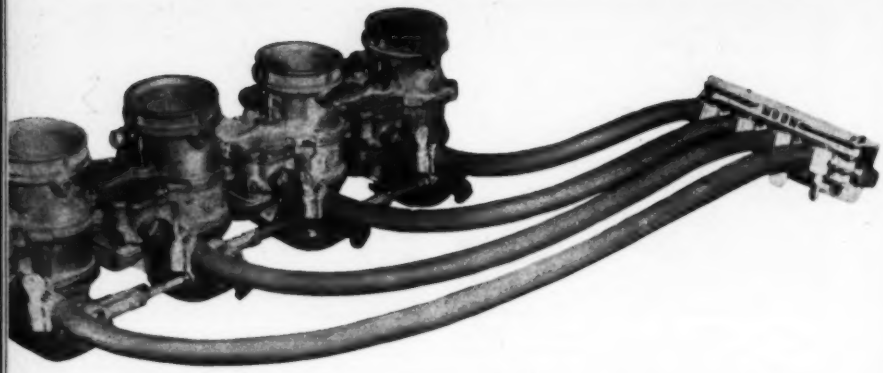
As soon as the metal work was out of the way the car was painted a two-tone combination of black and pink — *primer!* A little more metal work is still in the offing so the final lacquer job will have to wait for awhile.

The original upholstery was stripped from the interior of the Bel Air and replaced with leatherette of antique white and pink. This, together with the two outside shades, gives the custom a startling appearance.

Bystanders stop and stare at Jim Musick's ground-hugging creation as it proceeds slowly along the streets of Modesto — where nothing ever happens.

Functional airscoops were cut into fenders after removal of original trim. "Teeth" will be added.





ACCESSORY INSTALLATION

By Moon Automotive

Fuel Blocks for multiple carburetion.

Last month in this column we described the proper manner in which to install multiple carburetor throttle linkage. As a follow up, we will continue along these lines and show you the correct procedure for mounting the increasingly popular fuel block kits.

As is generally the case with any engine accessory, there is more to it than simply bolting it down. A certain amount of thought should be given the project before actual work is attempted.

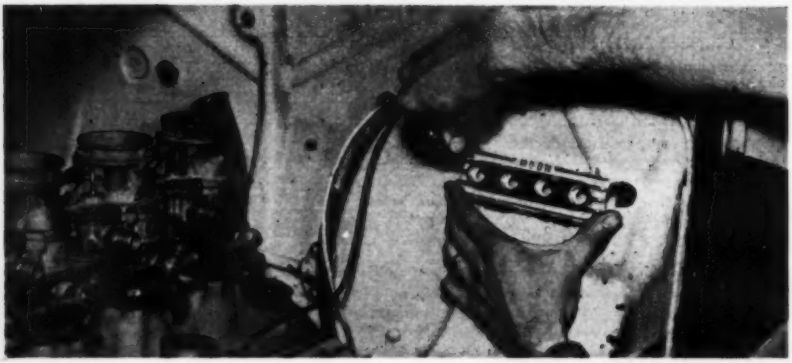
The most important item, of course, is the obtaining of a fuel block. There are many makes of these blocks on the market today but only a few of them have a built in chamber that acts as a fuel reservoir. This assures a quantity of fuel in the block at all times and whenever it is needed.

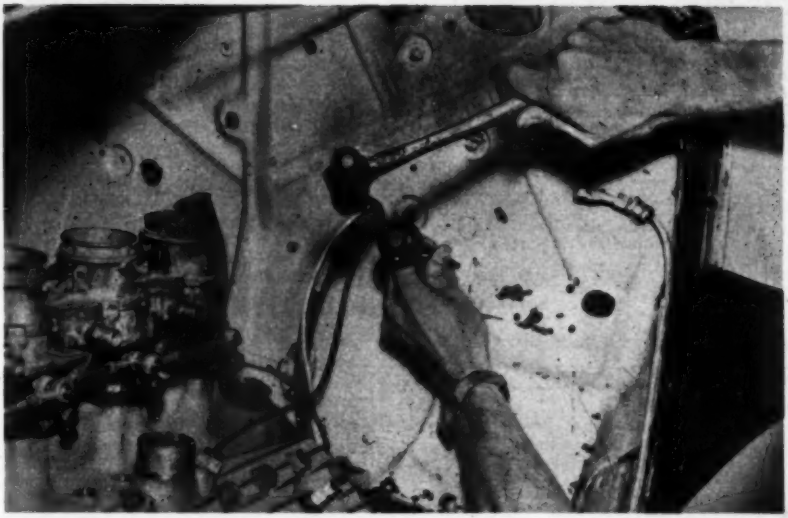
The second item is to check the kit and see that it contains all of the necessary fittings, hoses, hose clamps, etc. Nothing is more provoking than having to buy extra parts for a "complete" item.

Thirdly, see that the fuel block is equipped with enough fuel outlets to supply all of your carbs should you be using more than two.

The installation procedure is as follows:

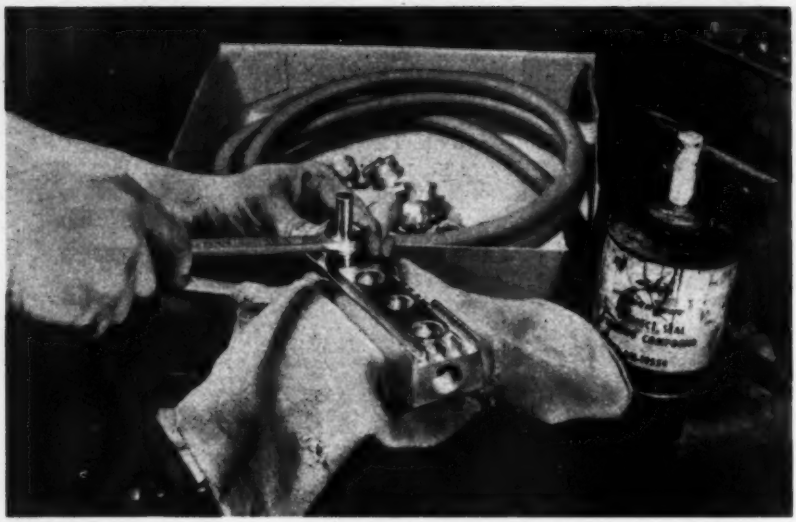
Select the proper location for the fuel block keeping in mind which end of the block the fuel will enter so proper clearance may be left for the hose and clamp. Scribe the mounting holes.





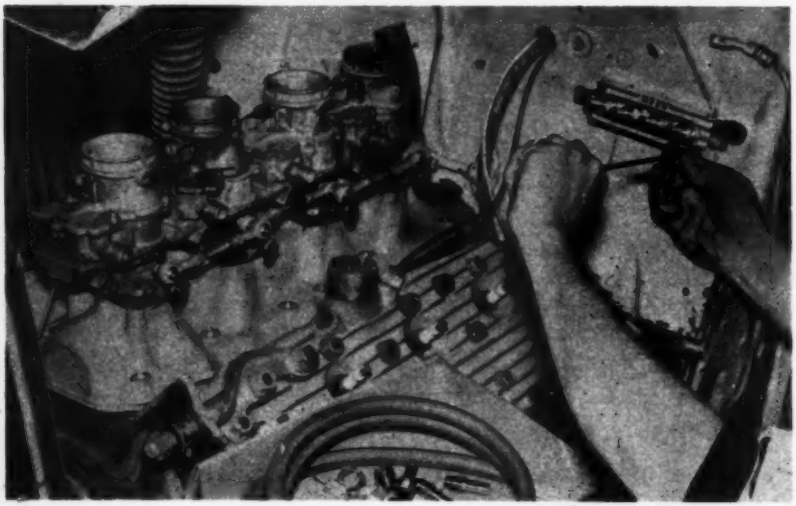
Center punch the mounting holes then drill out to the necessary size. Either machine bolts or self-tapping metal screws may be used, whichever type happens to be supplied with the kit. Fuel blocks are available in polished aluminum, brass or chrome to add to appearance of your engine compartment. If you wish to add a fuel pressure gauge, tube hole should be cut now.

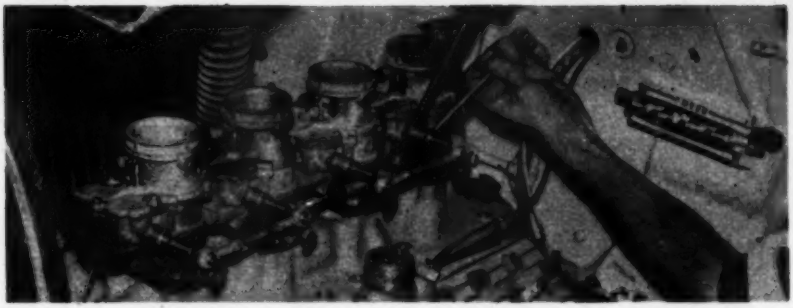
With the firewall readied to receive the fuel block, attention is turned to the block itself. Clamp the block in a vise using a shop towel to prevent marring the finish. The necessary fittings may now be inserted using Permatex to insure a tightly sealed fit. This will not only prevent ethyl leakage, and the familiar stain, but will keep air from entering the fuel lines.



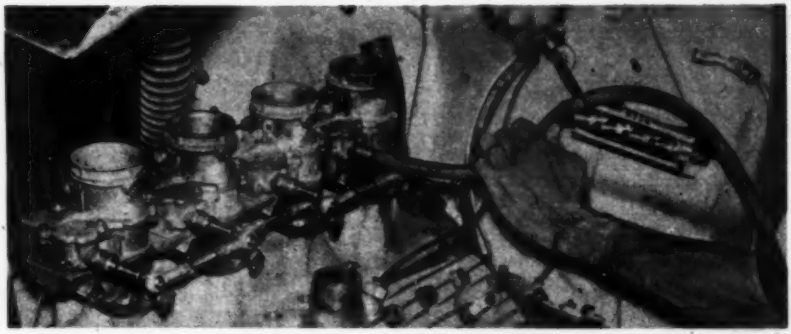
The fittings are now inserted in the fuel block. Box- or open-end wrenches may be used but *don't* resort to pliers. They will not only round the edges of the fittings, but make them extremely difficult to remove should you desire to do so. Do not try to hurry this operation, just take it easy and be sure that the fittings used are of the correct size. *Don't* strip the threads.

With the block completely assembled, it may now be secured to the firewall at the previously located position. Fuel blocks are a must for multiple carbureted engines for they provide an equal distribution of fuel to the engine. Very reasonably priced, complete fuel block kits can be purchased for as low as $10.00. Individual parts may also be bought separately.



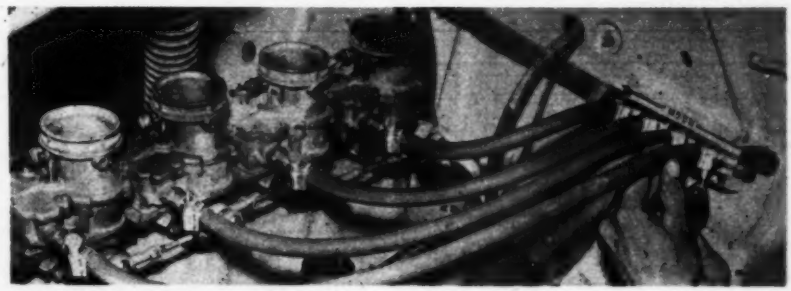


The carburetor fittings, included in kit, can be installed at this time. Like those in the fuel block, the fittings should be reasonably tight, but watch out for the threads! A pair of wrenches, as shown, can be used to assure a tight connection. Notice that the manifold has the same type of throttle linkage as was described in Accessory Installation last month.



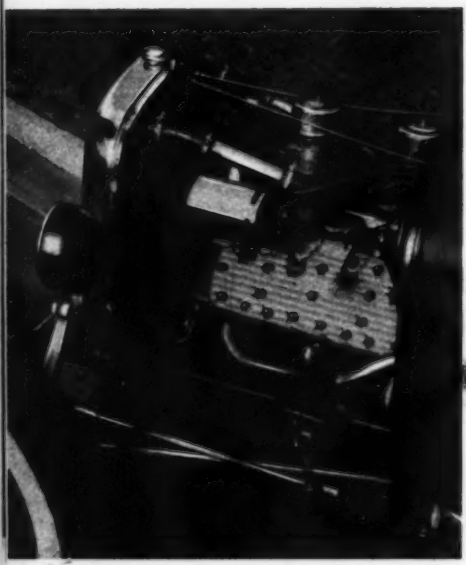
The neoprene tubing supplied with kit can be mounted now. Cut each piece to proper length by slipping one end on carburetor fitting and determining distance to block. Tubing other than neoprene should not be used. No rubber lubricant is needed at fittings. Notice that this engine has no fuel pump since the fuel is brought under pressure from the gas tank.

The clamps are now installed and tightened. The hose clamps are the same as those used on automobile heater hoses. Pliers are being used to take up the clamps but, like the fuel block and carburetor fittings, a too-tight fit is unnecessary. The engine will be hard to start now since block is empty, but carburetors may be primed or pressure applied to the gas tank.



SHORT and SWEET

What it lacks in length it makes up in strength.



WHENEVER Bill Vogt of Los Angeles drives down the street in his modified roadster, people like to call at him, "Hey, where's the rest of it?". His answer is usually, "That's all there is, there ain't no more!"

Though slightly ungrammatical, Bill is right in what he says. There used to be some more to the car, true, but there isn't any more. A good percentage of the former pick-up is now peacefully rusting away in some junk yard while the remainder is jauntily cruising around town.

It all started several years ago. Bill's father owns the Kaiser Korner in Los Angeles so when Bill wanted a car that would really go he began casting about amidst the Kaiser merchandise to see what he could turn up. The result was a Henry J sedan with a modified Kaiser 6 engine. The car could more than hold its own on the street or at the drags but when Bill was called into the service he was forced to sell his pride and joy and forget about cars for awhile.

He *tried* to forget cars, that is, but he just

Most of the engine accessories were chrome plated as were steering and chassis parts. Equipment includes Howard cam, Edelbrock heads, Weiand manifold, Kong ignition and Advance headers.

couldn't seem to. During his visit with Uncle Sam he thought and planned and figured until the time he was discharged. By that time he had made up his mind what he wanted and when he arrived home he began to build.

This time he over looked the possibilities of some of Kaiser's products and turned to Ford. He unearthed a shortened '29 A pickup powered by its original 4 cylinder mill. As soon as the car was his, the 4 came out — but quick! In its place was put a hefty '42 Mercury block, thoroughly rebuilt and bored to 3 9/16". Relieving wasn't necessary since this had been competently done at the factory. A Howard M12 cam was purchased and a set of 8.5 to 1 Edelbrock heads bolted down over eight Johns racing pistons. The carburetion department was taken care of by the addition of a Weiand dual manifold mounting a pair of "97" carbs. Kong supplied the ignition while Advance took care of the headers.

Bill decided to replace the original Model A transmission and this he did using a '39 Ford case with Lincoln Zephyr gears. While he was at it, the A rear end was discarded and replaced with a similar unit from a '40 with fifteen inches cut from the driveshaft.

For the stopping equipment Bill turned away from Ford products long enough to find a set of Kinmont disk brakes. Not only are they more than sufficient for halting the light weight bomb, but they look good as well.

While at the job of eliminating the original Model A equipment, Bill did away with the steering gear and stuffed a '32 Ford unit in its place. From a Ford of '40 vintage was taken a set of disk wheels. On these were mounted 5.50 x 15 white side walls in front and 7.00 x 16 whites for the rear. Needless to say, with the shortened wheelbase and the two sizes of tires the car presents a rather startling appearance when it is viewed from any angle.

Detail of exposed Kinmont disk brake in rear.

Camera distorted view serves to shorten the car even more than it is. '39 Ford taillights are located on either side of round gas tank. Despite wheelbase, the car turned 97 in ¼ mile.

1470 pound weight puts modified roadster well under minimum weight limit for fenders in Cal. Front end is comprised mostly of Model A parts. The front axle has been dropped only slightly.

Dashboard is original A equipment with added Stewart Warner instruments. Gas tank is placed in rear so room was made under the dash for a pressure pump. Upholstery in small cockpit is brown and beige leatherette. Body was pickup. Remainder of body and frame is in junk yard.

With the running gear and power plant taken care of, the car was driven down Inglewood way to Johnny's Upholstering Shop. There the tiny cockpit was beautifully appointed with a two tone combination of brown and beige leatherette.

From the upholstery shop the car made a short trip to the paint shop where it was covered with a striking lacquer color of 1953 Buick Manderin red—which closely approximates metallic maroon.

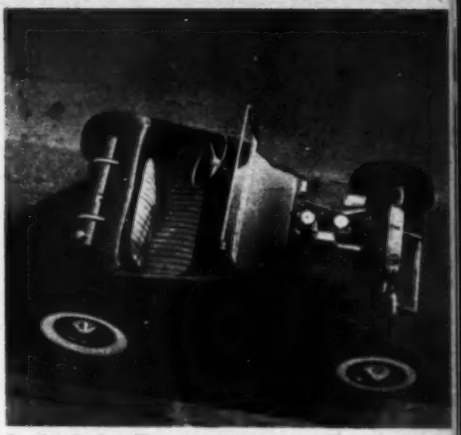
Though the employees at his father's Kaiser agency take a rather dim view of something comprising parts from a rival company, Bill did most of the work there using the practically limitless facilities of the dealership.

The first thing Bill did with the car when it was completed was enter it in an auto show where it won an award of excellence. The next stop was the nearest drag strip where it succeeded in blasting its way down the quarter mile lane at 97 mph. Bill reports, though, that handling isn't the greatest under extreme acceleration, however it suits him fine around town which is where the little modified spends most of its time.

Fenders? It doesn't need them. The California law places the weight minimum for fenders at 1500 lbs. and Bill has succeeded in beating that figure by almost thirty pounds.

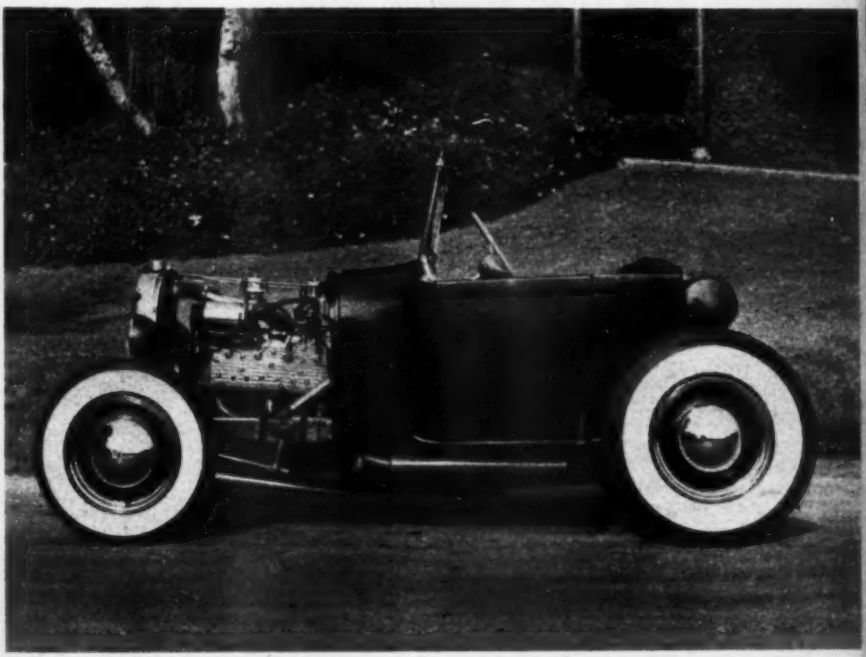
And that's the long and short of it!

Although much shorter than an average car, roadster has all necessary equipment to be considered as such. The color scheme of red, white and chromium is evenly distributed.



Overhead shot illustrates compactness of car. Notice chrome header pipe ahead of rear wheel. Modifications to body include channeling, cowl vent filling and removal of the door handles.

"Egad! Where's the rest of it?" is a familiar question to modified-roadster owner Bill Vogt. "There isn't any more!" is the regular answer. The wheelbase of the 29A is reduced to 87 ins. Sharp size contrast can be seen between front and rear tires. Lacquer paint is Manderin Red.



PENDULUM PEDALS

(Continued from Page 24)

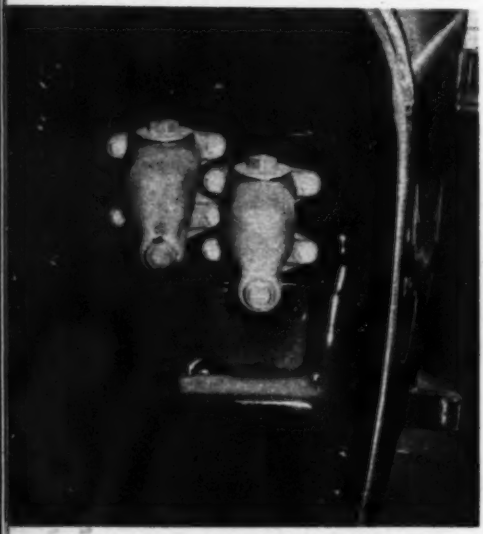
which was obtained from a surplus store. As can probably be ascertained from its name, the cylinder reacts exactly as directed by a chief, or master, cylinder. The small cylinder that Doane obtained had an inside diameter of one inch as did the '52 Lincoln master cylinder. Therefore, when the system was filled with hydraulic fluid and in proper working condition, the slave cylinder piston moved exactly the same distance as did the master cylinder piston. With the slave cylinder mounted alongside the transmission case and connected to the throwout bearing, it, and the master cylinder, had only to be connected by a flexible brake line thus eliminating complicated linkage.

The two items which had to be purchased from an auto dealer were the twin master cylinders, one with the plunger assembly and one without. This necessitated a cash outlay of less than $10.00. Late model, overhead-type Ford master cylinders could have been used but their cylinder diameter is ⅞" and a correspondingly small slave cylinder would have had to be found unless mathematics governing the stroke of the cylinder and the slave unit had been brought in to play to determine the necessary stroke. It may be seen that with a master cylinder diameter of ⅞" and a slave cylinder of 1" diameter the slave cylinder piston would have traveled only ⅞

(Continued on Page 56)

Assembly as seen from left side shows links to master cylinders. Clutch operates right cylinder through '39 Ford cross shaft. Brake pivots on cross shaft and operates left master cylinder.

Twin master cylinders as seen from firewall side of roadster. Cylinders are staggered for mounting ease. Their accessibility is obvious. Hydraulic lines are not installed in this photo.



Notice that cylinder is to be mounted on the *right* side of transmission. This was done to provide the maximum of foot room for driver. Cylinder is held in place by a simple clamp. Slave cylinder in mounting relationship to the transmission case. Cylinder, obtained at a war surplus store, has a one inch diameter bore.

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(Continued from Page 54)

as far as the master cylinder piston.

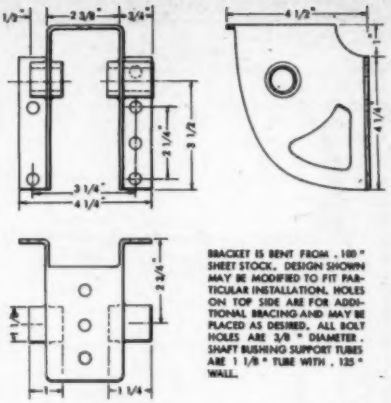
A secondary reason for choosing the Lincoln cylinders instead of the Ford units was Doane's use of a '39 Ford pedal assembly pirated from a wrecking yard. The older Ford master cylinder piston had a 1" diameter and eliminated the need of reworking it to fit the Lincoln unit.

The largest fabricated part was the bracket from which the pedals hang. It was built from a piece of sheet steel having a thickness of .100" and bent to the shape desired. As can be seen in the large drawing, the bracket was fitted with two shaft bushing support tubes, of 1⅛" outer diameter, into which were pressed bushings having an inner diameter of ¾". At the time of the purchases, the ¾" bushings were all that Doane could lay his hands on so the '39 Ford cross shaft had to be turned down to fit. Had 1" bushings been available, this would not have been necessary.

The clutch pedal, to the left side of the assembly, is from the same '39 Ford assembly while the right pedal, operating the brakes, is from a '34 Ford. Both pedals had to be heated and bent to the proper shape after the length of the pedal stroke needed and the amount of leverage required had been necessarily determined.

The twin master cylinders were mounted on the firewall, one slightly below the other so that they could be located close together. The left hand clutch pedal operates the right master cylinder and the right hand brake pedal actuates the left cylinder as can be seen in the drawing.

The remainder of the assembly is composed entirely of Ford parts. Those items other than '39 Ford pedal assembly parts are listed by part number elsewhere in this article.


1/2"
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4 1/2"
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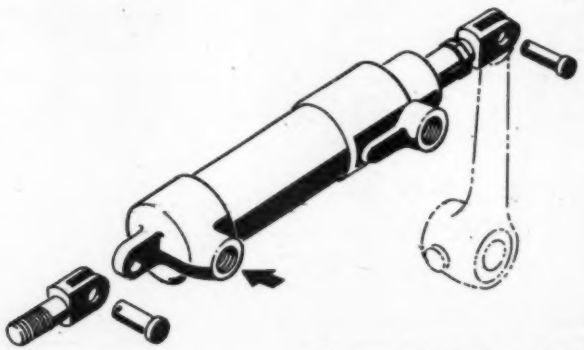
1"
1 1/4"
BRACKET IS BENT FROM .100" SHEET STOCK. DESIGN SHOWN MAY BE MODIFIED TO FIT PARTICULAR INSTALLATION. HOLES ON TOP SIDE ARE FOR ADDITIONAL BRACING AND MAY BE PLACED AS DESIRED. ALL BOLT HOLES ARE 3/8" DIAMETER. SHAFT BUSHING SUPPORT TUBES ARE 1 1/8" TUBE WITH .125" WALL.

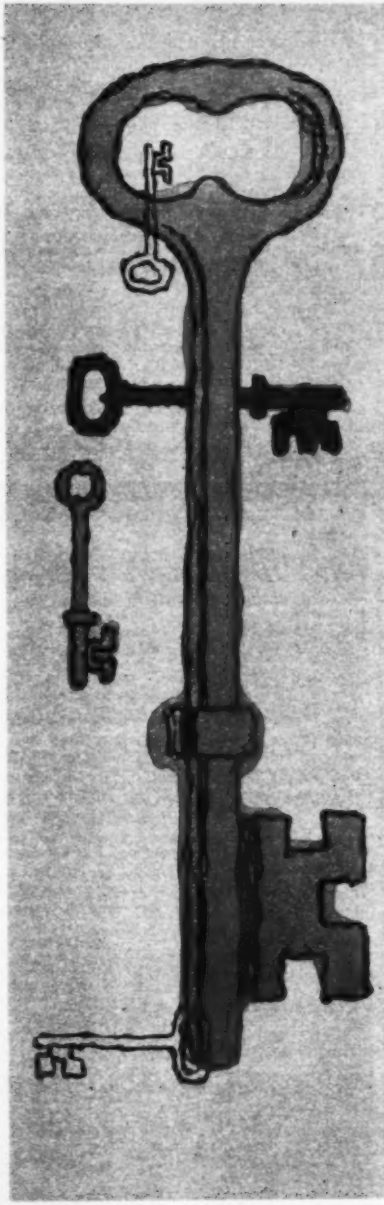
Once it was seen just what modifications had to be made to the existing parts and how the component parts had to be positioned, the construction of this fool-proof assembly went ahead swiftly.

Doane Spencer's achievement shows that patience, quality workmanship and an understanding of the interchangability of Ford-built parts is all that is required to produce a pendulum pedal assembly and he is to be congratulated for carrying out his project and thanked heartily for bringing it to the attention of ROD & CUSTOM's readers.

Drawing of the slave cylinder showing relationship to clutch throwout linkage which has been moved to *right* side of transmission case for added foot room for driver. Arrow indicates opening for the passage of hydraulic fluid. Upper opening will be capped with a breather to prevent dirt infiltration. Piston assembly has been spring loaded to assist movement to the contracted position.

SPRING-LOADED ACTUATING UNIT





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THE BARRIS KORNER

(Continued from Page 39)

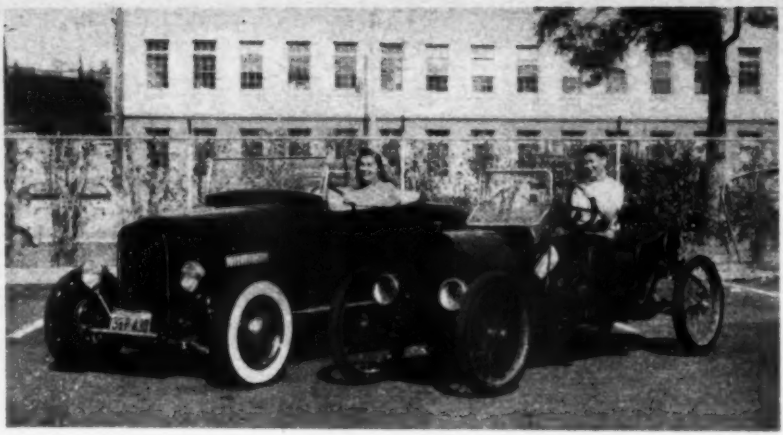
a similar amount so that a minimum of panel distortion would result but still provide a comparatively large opening. The upper edge of the scoop was fitted with a section of ½" rod adding both strength to the fender panel and forming a smoothly curved leading edge. A duct was added beneath the fender to guide the air to the brake assembly for cooling purposes during high speed braking.

Nearly any American automobile can be fitted with scoops which should provide an outlet for the design genius of some of our kustom-conscious readers. Care should always be observed when it comes to slicing away at a panel but anyone with but a slight knowledge of body and metal work and with a minimum of tools can complete a successful job if a lot of thought is given the matter before the torch is brought into play.

This article should serve to stimulate the imagination, so go ahead and give your car that kustom look, but—don't bite off more than you can chew.

Round rod is used to form leading edge of the fender airscoops on this modified Jag XK 120. After slitting fender, rear panel was raised and forward panel dropped for minimum metal distortion. Several days were needed for job.

Bob Hirohata's 1951 Mercury has had airscoops built into rear quarter panels to break up the flat sided appearance of this car. Three metal teeth, graduated in size, are used for effect.



WhATSit?

The mystery of the stray photograph.

PHOTOGRAPHS HAVE a bad habit of falling out of the file cabinet around here, and sometimes a stray picture or two is uncovered from behind the water cooler or out of a musty closet. Whenever this happens, all hands are ordered on deck to see who can identify the photo so that it can be returned to its rightful location. Several old photos were thus properly situated at a recent mustering – all, that is, except one. The photograph, reproduced above, doesn't ring a bell in anybody's head nor will our photographers claim it as being taken by them. It can't have blown in the window or have fallen out of a hovering helicopter so it must have come from somewhere within our inner sanctum.

Can you help us out of this dilema? If we could but identify either of the two young ladies or the '29 A roadster, then we'd have something to go on. However, it is the car (?) on the right that has us all sitting around scratching our heads. What is it? – or, was it?

From what we can see, the front suspension is similar to that used on an old American Underslung – the axle is *over* the frame. The rear suspension, though, seems to be of the conventional type. The body is a touring car type but of just two passenger capacity.

In contrast to the white wall tired roadster next to it, the touring car is equipped with little more than bicycle wheels and with tires bearing the familiar NON SKID repeated over and over around their circumference.

In order to return this photo to its former resting place in our files, we must first know something about the tourer. Since no one around here can shed any light on the subject we are willing to award a one year's subscription to ROD & CUSTOM magazine to the first person giving us a clue to the make, or the builder, of this unusual, narrow vehicle. Just drop a card, bearing your answer, in the nearest mailbox after having addressed it to us at 4949 Hollywood Blvd., Hollywood 27, California.

. . . . .

At the time this is being written we have not yet received a clue to last month's "Whatsit?" so the announcement of the winner must wait at least another month. Due to the time requirements of R & C, the answers to the problems presented in this column must necessarily wait from two to three issues. The winners and addresses will be given as soon as possible, though, and commencing with the month a certain winner's name appears, he will receive the first of his twelve issues of R & C. Present subscribers will automatically receive a 1 year extension.

Technical Tips

SECTIONING PROBLEM

I have a '49 Ford club coupe that I am going to section. Could you give me the information on how to do this job? Also, what is the most that this car can be sectioned without running into an impossible amount of work? I am 5' 8" tall so don't need a very high car to ride around in.

Chester Perkins — Phoenix, Arizona

• *Past installments of "The Ten Steps to Customizing" have discussed sectioning. The job is one that should not be attempted by the novice. As for it being an "impossible amount of work", a one-eighth inch sectioning job would be almost as much trouble as a five inch job. When considering sectioning, don't stand back and look at the outer skin of the car. Though this is the portion that requires a smooth finish, it is the inner structures that cause the most headaches. For example, remove the upholstery from a door, if this looks a little discouraging give up the idea for the remainder of the car is even more complicated.* — *Tech. Ed.*

TECH. TIP SOLUTION

While reading your Sept. issue I ran across a letter in Tech. Tips from a reader who was having difficulty silencing his headers. I had the same trouble with my car — a '51 Ford V8 with Fordamatic. I eventually discovered that the left header was coming in contact with the steering column which caused the sound to be transmitted into the interior of the car.

Harlan Levoroon — Lake Mills, Iowa

• *Thanks, Harlan, maybe reader Allan Hedberg can benefit from your experience.* — *Tech. Ed.*

CHROME TRIM AND GLASS QUERY

I am a great fan of R & C and have been reading it since its inception.

I took a particular interest in your September issue that featured a restyled Chevy on the cover. I have a car similar to that one — a standard — and would like to know how to install the chrome trim around the windshield and back window. I would also like to install a one-piece windshield in my car and would appreciate your advice on how to go about it.

What is meant by frenched headlights?

W. D. MacDonald — Roanoke, Virginia

• *Stock Chevrolet chrome trim may be installed on your standard model by replacing the rubber channeling that holds the glass in place. The channeling for the Deluxe models contains a slot into which is inserted the lip on the under side of the trim. To do the job, it is necessary to remove both the windshield and rear glass from your car, procure the new rubber channeling and the necessary chrome trim, then reinstall the parts.*

A one-piece windshield can be installed by using the glass from a comparable model Oldsmobile 88 or '53 Chevy. The process requires only the removal of the original two-piece windshield and the elimination of the vertical rubber and metal dividing posts. After that, it's a simple matter to reinstall the one-piece glass.

Take a look at the headlights on your car then compare them with the headlights on our cover car for September. The difference is "frenching". It is accomplished by brazing the chrome rim to the fender and leading the two together. — *Tech. Ed.*

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WHAT IS IT?

We started reading your magazine with the October issue and have found that it is a great little book. We have been following your "Ten Steps To Customizing" as we are modifying our car. Thanks for bringing to our – and to others – attention the little details involved with a customizing job. Many of the things have been neglected in other articles making the job doubly difficult.

At the present we are still in the process of building our car. I don't know what you'd call it, but we started with a '41 Ford coupe and have succeeded in changing the body to a convertible. The front fenders, hood and grille shell are '42 Ford while the grille itself will be from a '53 Nash Rambler.

The engine was replaced with one from a '46 Mercury. The rear end is from a '46 Ford as is the transmission.

We are wondering whether it would be possible to install in our car the steering assembly from a '48 Hudson and the front suspension from a '52 Ford. Would these changes amount to a great amount of trouble?

George and Dave Tryban — Chicago, Ill.

• *Your car sounds rather interesting, fellas, but why the Hudson steering? It would be possible to install the unit but we rather feel that the result would not be worth the effort. If its quicker steering you want, merely lengthen your Pitman arm. As for the front suspension, it is possible, but not easily done.* *Tech. Ed.*

A HACKED DODGE

I have just finished reading your October issue. It was *great!* Keep up the good work!

I own a '37 Dodge and would like some advice on how to go about chopping it. I would also like to have your opinion of how much to chop it. One more question: what is the best way to fill in molding holes?

Frank Morris — St. Louis, Mo.

• *Earlier instalments of The 10 Steps To Customizing gave the procedures necessary for both top chopping and de-chroming. R & C for January 1954 showed a chopped '48 Ford with some photos made during the chopping operation. Suggest you refer to these for information. As for a suggestion, I wouldn't lower the roof any more than 3½" for more than this would decrease visibility dangerously.* *Tech. Ed.*

STICK SHIFT OLDS.

I have a '50 Olds with Hydramatic and would like to install a standard transmission. What transmission should I use and how much expense and trouble would it be?

R. Lawton — Lycoming, N.Y.

• *For simplicity I would suggest using a '49 or later Oldsmobile standard transmission. However, these are quite scarce and would probably require searching many wrecking yards. Check with your Olds dealer, he should be able to help to order one for you. The cost could be offset by the sale of your Hydramatic if you can find someone who wants it badly enough.* *Tech. Ed.*

MORE ABOUT LOWERING

First of all I want to say that I truly enjoy reading R & C and I look forward to each issue.

How much will it cost to have the frame C-d on my Merc? If I used just lowering blocks, how far down could I go before running into trouble? I'd like to have the rear fender skirts covering the wheel completely so that the tire alone is exposed.

Louie Espinosa — U. S. Army

• *You seem to be under the misapprehension that C-ing lowers a car. This it does not do. C-ing means merely the arching of the frame directly over the rear axle so that if the car is lowered it will not hit bottom quite so easily. Don't use lowering blocks over three inches in thickness if you want to save your universal joints.* *Tech. Ed.*

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our reader's customs...

SAN DIEGO CUSTOM

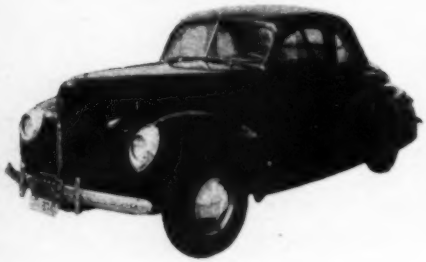
Congratulations on a fine magazine! It is packed with good articles accompanied by fine photos. For its size, R & C certainly does a good job of covering all phases of the automotive world.

I have never missed an issue of R & C but seldom do I see or read about a Rod or a Custom from San Diego. Therefore, I've enclosed a photo of my car. It is a '52 Chevy Bel Air with the hood and deck filled and with an electric solenoid used to unlatch the trunk.

The interior is done in Regent Maroon leatherette. The seats, doors and kick panels are pleated and rolled. The headliner is also leatherette and the carpet is maroon wool.

The engine is stock right now but I hope it won't be for long.

Bob Johnson — San Diego, Calif.



OREGON VS. PENNSYLVANIA

Having been an avid reader of your magazine since it first hit the newsstands and an enthusiast of fine rods and customs, I found it somewhat of a shock to pick up your October issue and find on page 6 a very disgusting photo, and an accompanying letter, of a "custom" (?) '40 Ford.

So-called rods of this kind and the people who drive (?) them are what give true auto enthusiasts a bad name in most communities.

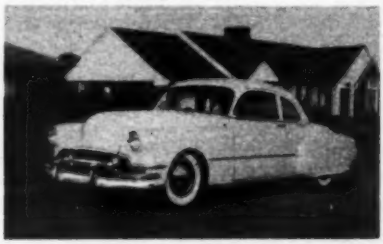
Having been a resident of Oregon for some 17 years I have become accustomed to seeing the cream of the crop in fine workmanship and design that has come out of California and other west coast states in recent years. I find it hard to believe that R & C cannot find enough good pictures to print in Our Reader's Customs and so must stoop to the common Gook job to fill up the pages.

Enclosed is a picture of another '40 Ford, this one owned by a buddy of mine, Jim Kelley, from San Diego, Calif. Though it may not be thrillingly outstanding, it shows the clean lines and workmanship that definitely draw the line between customs and Gooks. The engine is a '48 Merc bored out to 3 5/16", it has a ¾ cam, high compression heads, dual carbs, and headers.

Though this engine shows substantial power it failed to hit the "actual clocked 103 mph" of the Pennsylania '40 mentioned above. Perhaps our friend could use more "blow" on his engine and less in his conversation.

Earl Christensen — USAF, Texas

• *Don't get sore, Earl, we printed the photo and the letter to see if we could get a rise out of some true rodders, which we did, and to see if the Gook job would provoke other readers to send us some photos of clean rods and customs, which it did also. No harm done but we apologize, O.K.?*



RESTYLED PONTIAC

I hope my car is worth recognition in your magazine. It is a '49 Pontiac club coupe. I haven't seen many Pontiacs in R & C and have been wondering why. *(Ed. note. They're seldom customized.)* I bought my car a little over a year ago and it was the stockest looking stock Pontiac in Oklahoma. Later I decided to change the car's looks a little and get rid of the "juke box" trim. The deck was

shaved first, then the hood—no simple matter. Then the headlights were frenched using Merc rims. The rear fenders caught it next. The chrome trim and the gravel guards were removed and the holes filled. I discarded the stock skirts in favor of those from a '51 Mercury. I replaced the 2 piece windshield with a single curved glass and brought the exhausts out through the rear bumpers.

Next, I lowered the car fore and aft and painted it white. The interior is black and white leatherette.

Most of our customs here in Oklahoma are on the conservative side due to the roads here but Oklahoma City is rod conscious and the fellows are working to obtain a drag strip.

Don Mann Oklahoma City, Okla.

• *That's a fine looking custom, Don, very unusual for a Pontiac. Hope Oklahoma City gets its drag strip real soon.*

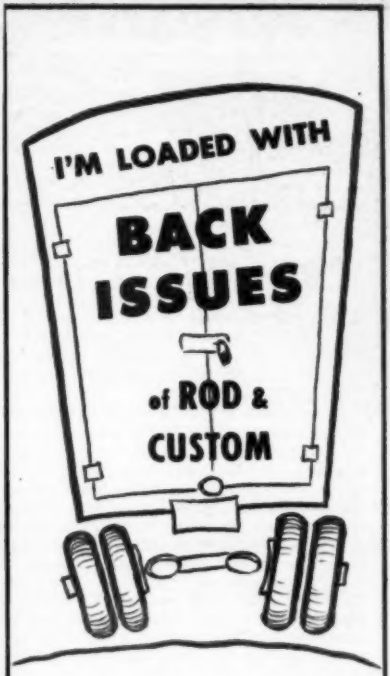
CRUSADER'S CAR

I am sending you a photo of my '50 Chevy hoping you can find a place for it in your fine magazine.

The headlights have been frenched and the hood, trunk, gas pipe cover and fenders have been molded in. The stock taillights were replaced with those from a Pontiac. The car has been lowered three inches in front and five inches in back. The hood has been louvered. The doors are electrically operated but I also have a manual cable in case of electrical failure.

The engine has been equipped with an Offenhauser dual intake manifold with Carter carbs. I am a member of the CRUSADERS, a car club here in Long Beach.

Clarence Huffman Long Beach, Calif.



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SMALLEST OHV V8

(Continued from page 11)

oil pump which will supply lubricant to all the parts of the engine under pressure. This system was side stepped previously for fear of ruining the crankshaft during the drilling operations. Seymour has regained his nerve now and hopes to have the full pressure oiling system in operation in the near future.

The oil pan, like most of the other parts of the tiny V8, was machined from a solid block of aluminum. It has a wall thickness of ⅛" and conforms precisely to the shape of a common engine pan – even to the drain plug located at the rear of the unit. Extending from the right side of the pan, just below the headers, is the oil dipstick. It is complete even to the "add-oil mark" with which most of us are familiar. Incidentally, there is nothing ornamental or phony about this engine. It is a precision, functional piece of efficiently operating machinery!

The ignition is no different from the ignition of any engine – except that it's a good deal smaller. Electrical power is currently supplied by three dry cell batteries. The juice flows through a model airplane coil then to the distributor (mounted at the forward end of the cam). From there it continues to the points and finally to the eight Champion model airplane spark plugs. The firing order was not necessarily copied from the firing order of a common V8 engine although it is the same. The firing problem was answered by building the distributor so it would fire first at no. 1, then at no. 5 then at 4-8-6-3-7-2 in that order.

When we asked Seymour the following question we fully expected to get a "No" answer but we were wrong when we found out that the engine does have jackets. *Yes, it's water cooled!* Water inlets are located at the top forward end of each cylinder bank. The coolant will circulate through the heads and the block eventually exiting below the headers. A radiator is the next project in the offing so at this time water has not been actually supplied to the engine. It will, though, run for a good ten minutes before becoming dangerously hot.

Like many other things, clearances in the V8 are not scaled down accordingly as one would imagine. Nevertheless, the pistons have a clearance of only .0015" but Seymour reports that it burns considerably more oil than it should. The four-ounce capacity pan has to be replenished with 10 wt. oil quite frequently.

The valve clearances are set at – well, they're set "just right". It's really a guess-feel arrangement. The valve springs, some of the few purchased items, were obtained at a hardware store. Nobody could say just how strong the springs should be so Seymour took a wild guess and he seems to have hit the right combination the first time. At least, they haven't given any trouble as yet.

Allen cap screws were used throughout the engine because they seemed to be of the strongest material available for their size. However, they represent perhaps the largest single cash outlay of the entire project. Incidentally, the aluminum and steel billets plus the necessary purchased parts bring the cost of the V8 up to $125.00 – proportionately in keeping with its small size. Seymour warned us, though, that a project of this magnitude should not be undertaken by anybody who does not have access to a machine shop outfitted with a complete collection of the proper machine tools.

At the first bark of the engine, Seymour was overjoyed as can well be imagined. His joys were short-lived, though, for the engine stopped unaccountably after a few moments. Nevertheless he cranked it over again and was happy to hear it roar to life – only to sputter and die as before. This disheartening series of events continued for several weeks until the trouble could be traced to improper valve seating and to the carburetion. He tore the engine down and carefully re-lapped the valves. Then he built another carburetor. After a month or so of similar alterations the V8 was started and this time its sharp exhaust rap settled down to a rhythmical beat and it continued to purr for several minutes. As soon as the throttle was advanced, though, the engine sputtered and died as it had previously. Seymour correctly determined the trouble could be blamed on both the carburetion (again) and the ignition.

Down came the engine for the umpteenth

Ten pound, 4.83 cubic inch, ohv V8 engine with some of its parts. Outstanding are the 7 inch cam and the 9 inch headers. Note size of the valves, pushrods, and cam followers compared to the normal size wrist watch at the left. Project, from planning to completion, required six years. Actual building time was one year. The tiny engine is water jacketed for cooling.

time. This time it received a new intake manifold and carburetor plus a reworked distributor. Again and again the V8 was started and again and again it died after running for only a few moments. In frantic desperation Seymour disconnected the fuel line which had been supplying Ethyl gas to the carburetor and attached a rubber hose leading to a natural gas outlet in the workshop. This time the engine screamed anew and continued to run until Seymour decided to shut it off. He affixed an extremely accurate tachometer to the flywheel end of the crankshaft and started the engine as though it were an outboard — with a rope. The tach needle climbed swiftly to 7000 rpm and hovered there until the throttle was dropped back to idling position. The engine slowed itself and settled down to a steady 900 rpm without missing a beat. Quick movement of the throttle showed that the engine, in spite of the too-heavy flywheel, was immediately responsive to control.

At the time of this initial running of the pint sized mill the rods and the crankshaft were not properly balanced, the valves were not seating as they should and the igntion missed a little at certain speeds. At the same time the flywheel weighed more than 4 pounds and the intake manifolding was *still* not functioning properly. Add to this the fact that the compression ratio was but 4½ to 1 and you can well realize that 7000 rpm is absolutely amazing.

These conditions have been corrected, now. The heads have been milled to give a 7 to 1 compression ratio and our friend Navarro is looking into the carburetion department. Nearly completed once again, the engine should roar to new life in a month or so and is expected to wind up over 10,000 rpm — quite a fete for any 4-cycle engine regardless of its size!

Like its larger counterparts, the miniature V8 contains gaskets to minimize leakage. The number of gaskets, though, is quite low. One for each head, one for the pil pan and one for the timing gear cover plate. The remainder of the precision engineered machine needs no such items.

Why did Seymour spend thousands of spare time hours, including every weekend, for a period of two years building an engine too expensive to mount in a miniature car or boat? Merely for the reason that he wanted to, it's as simple as that!

Currently in the planning stages are the oil pump and the radiator, as previously stated, and — believe it or not — a *dynomometer!* The actual horsepower output of the ohv V8 cannot be accurately determined without such a device neither can a torque reading be taken without a similar unit. Seymour figures, however, that with a total displacement of 4.8312 cubic inches and with the present compression ratio of 7 to 1 using ordinary gasoline as a fuel, that the final output should be close to 2 or 2½ horsepower. Not bad — not bad at all for its size.

Thousands of hours were spent by owner Seymour before the engine reached completion. Precision workmanship and extreme neatness are apparent. Actual cash outlay was but $125 but thousands of dollars in machine tools were used during construction. Seymour does not recommend that similar project be undertaken by anyone due to the extremely difficult problems which arose.

Also undergoing careful consideration are the following items so necessary for any engine. A generator, a bell housing containing a much lighter flywheel and with a clutch, a transmission, an appropriate engine stand and a fuel pump.

Again Seymour asks us to warn our readers not to undertake a similar project without a thorough knowledge of metallurgy, a completely outfitted machine shop, the patience of Job, an understanding wife, a disregard for mistakes and wasted time (as evidenced by a large assortment of completed but unused parts) and a self-gained knowledge of internal combustion engines.

Norman Seymour receives our vote for ROD & CUSTOM's Man of the Year for doing something that approaches the impossible. He had set himself an extremely challenging goal which he attained only through the most tedious and painstaking work. He is to be congratulated upon the successful completion of something which few people would ever undertake, much less finish, and something that many of our so-called "engine specialists" would have hopelessly given up while the project was still in the drawing board stages. Furthermore, ROD & CUSTOM has chosen to call this the World's Smallest Operating ohv V8 Engine. Any objections?

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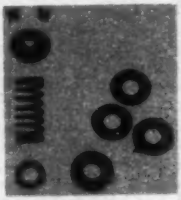

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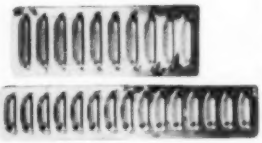

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